Drug Availability Estimates in the United States

DRUG AVAILABILITY STEERING COMMITTEE

December 2002

NCJ 197107

DRUG AVAILABILITY STEERING COMMITTEE

DRUG ENFORCEMENT ADMINISTRATION (CHAIR)

OFFICE OF NATIONAL DRUG CONTROL POLICY

DEPARTMENT OF JUSTICE

DEPARTMENT OF STATE

DEPARTMENT OF DEFENSE

U.S. COAST GUARD

U.S. CUSTOMS SERVICE

CRIME AND NARCOTICS CENTER

NATIONAL DRUG INTELLIGENCE AGENCY

EL PASO INTELLIGENCE AGENCY

TABLE OF CONTENTS

List of Tables

List of Figures

Acknowledgements

This research was conducted and reported under the guidance of an interagency Drug Availability Steering Committee (DASC), lead by the Drug Enforcement Administration. Members of the DASC included senior-level executives from the following organizations: Office of National Drug Control Policy, Department of Justice, Department of Defense, Department of Treasury, Drug Enforcement Administration, Crime and Narcotics Center, the U.S. Interdiction Coordinator's office, U.S. Customs Service, and U.S. Coast Guard.

The efforts of DEA's Executive Policy and Strategic Planning staff are acknowledged for initiating this effort by preparing foundational estimates of drug availability. Special recognition is deserved by the chairmen of the six Working Groups, for their diligence in completing the task in a timely fashion. These agencies include: Defense Intelligence Agency (cocaine), Crime and Narcotic Center (heroin), Drug Enforcement Administration (methamphetamine and seizures), National Drug Intelligence Center (marijuana), and Office of National Drug Control Policy (consumption).

In addition to the DASC organizations and the agencies chairing the Working Groups, the following other organizations provided data and personnel for these Working Groups and their cooperation is especially recognized: Department of State, National Guard Bureau, El Paso Intelligence Center (EPIC), National Institute of Justice, Substance Abuse and Mental Health Services Administration, Joint Interagency Task Force West, U.S. Forest Service, and Agricultural Research Service.

This effort also appreciates the support provided by the Defense Information Services Agency for providing the ADNETU WebShare forum to the Working Groups for expediting communication and information sharing.

Thanks to Ms. Bonnie Robinson, ONDCP Program Support Specialist, for providing extensive editing and publishing corrections to facilitate the final printing of this report and posting of the electronic version.

Executive Summary

Background

Drug availability estimates for 2001 were developed for the four major drugs: cocaine, heroin, methamphetamine, and marijuana. This effort responded to a request from the U.S. Attorney General for measurement of the quantity of illicit substances available to drug users in the United States. There is significant uncertainty in these estimates due to the illicit and clandestine nature of the various drugs, and the limited data currently collected to aid in these analyses. Therefore, caution is urged in the application of these estimates.

Six interagency working groups (one for each of the drug-types, a consumption working group and a seizure working group) were formed and staffed by members of the following federal agencies: Crime and Narcotics Center, U.S. Customs, Drug Enforcement Administration, Defense Intelligence Agency, Department of Justice, National Institute of Justice, El Paso Intelligence Center, Joint Interagency Task Force West, National Drug Intelligence Center, Office of National Drug Control Policy, Substance Abuse and Mental Health Services Administration, Department of Treasury, U.S. Coast Guard, and the U.S. Interdiction Coordinator. This document is the compendium of the reports from each of the six working groups.

Results

The table below summarizes the working groups' drug availability estimates. Federal-wide drug seizures are also shown to provide context to the drug availability estimates. The availability estimates are presented in ranges, and, in some cases, fairly wide ranges. It is important to understand that supply-based estimates for cocaine have matured over several years of research and, therefore, present a more precise picture. On the other hand, the estimates for methamphetamine and marijuana are developmental and, therefore, have a larger degree of uncertainty. In the table below, each drug availablities' methodology was assigned a rating to reflect the different maturities. The methodology used for the cocaine estimate is an "Approved" methodology because of its consistency among various independent data sets. Heroin is assigned a "Pending" rating, to reflect that it is in development and requires further analyses to determine its validity. The methodologies for the methamphetamine and marijuana estimates are assigned a "Preliminary" rating since they use first-time approaches and require more data to reduce their uncertainty.

Table 1: Drug Availability Estimates and Federal Seizures in Calendar Year 2001

DRUG	Maturity of the Methodology	Street Availability in 2001 (pure metric tons)	Federal Seizures in 2001 (metric tons)
Cocaine	Approved	260-270	106
Heroin	Pending	13-18	2.5
Methamphetamine	Preliminary	110-140	3.6
Marijuana	Preliminary	10,000-24,000	1,215

The importance of these estimates is not necessarily in the figures themselves, but in: 1) the process established to develop the figures, and 2) the application of those figures to other facets of the drug problem. Once fully developed, the measures of drug availability can be applied to issues such as performance measurement, threat assessment, and market modeling. But note that drug availability is one indicator of performance. And although these estimates were developed by federal law enforcement, intelligence, and health-related communities, controlling availability is the responsibility of many more governmental organizations than these.

- **Cocaine:** This estimate of 260-270 pure metric tons was determined through the integration of many routinely reported sources such as the potential cocaine production estimates reported annually by the Central Intelligence Agency, the Office of National Drug Control Policy's (ONDCP) annual consumption estimate, and worldwide seizure statistics. This mature methodology provided annual estimates of cocaine availability over the past six years, which show a convergence between both supply-based and demand-based approaches. The greatest uncertainty in the estimate is the amount of cocaine consumed by foreign markets due to a lack of routinely collected standardized data.

- **Heroin:** This estimate of 13-18 pure metric tons was based on the number of users, their frequency of use and expenditures, and the retail price of heroin. There is uncertainty in the estimate due to the widely varying prices of heroin and user behavior. A supply-based estimate could not be determined due to inconsistency between the current Colombia potential production estimate and the Heroin Signature Program's estimate of South American heroin entering the U.S domestic market. The apparent discrepancy requires the development of a follow-on process to develop a rational estimate.

- **Methamphetamine:** Domestic production is the primary source of methamphetamine available for domestic demand. The largest component of the 110-140 pure metric tons of methamphetamine is manufactured from diverted Canadian and U.S. pseudoephedrine and ephedrine. There is considerable uncertainty in the diversion figures, which highlights the need for improvements in tracking precursor chemicals in order to reduce their use in the manufacture of illegal synthetic drugs.

- **Marijuana:** The 10,000 to 24,000 metric ton estimate of marijuana availability was based on a two-part methodology that separately derived the quantities of foreign and domestically produced marijuana available. The speculative estimate of domestic marijuana production was calculated by applying three hypothetical seizure rates to domestic cannabis eradication figures**.** There is considerable uncertainty in the estimate due to the lack of direct information on the magnitude of the domestic production component. Development of either a cannabis signature to determine the source areas of seized marijuana samples, or a science-based estimate of illegal domestic cannabis cultivation, would significantly improve the accuracy of this estimate.

Follow-on Process

The process established over the past six-months, for consolidating various drug-supply data into methodologies estimating drug availability, provides many benefits to policymakers at the Department of Justice, the Office of National Drug Control Policy and the participating law enforcement agencies. The reports from each of the six working groups, not only provides estimates of drug availability, but recommendations on how to improve those estimates. This process must continue, albeit at a different level of effort, to respond to the action items generated by those initial reports.

The current set of estimates form a baseline that can enable trend analyses providing that similar estimates are made in subsequent years. These trends and estimates force the reconciliation of the various pieces of the counterdrug effort, thus leading to a more consistent foundation for drug policy.

A follow-on process, led by drug policymakers, will attempt to improve and update these availability estimates by improving the data sets that feed into these estimates. The executive-level interagency Steering Committee established for this initial effort will be continued for the follow-on process. Offices of Primary Responsibility (OPRs) will be established to execute the action items generated from the Working Group recommendations. The table below shows the significant action items for each of the six OPRs.

In summary, improved drug availability estimates are necessary to support decision-makers' need to understand the scale of the drug problem in America. Based upon the current estimates' uncertainties, the most important action items should relate to domestic marijuana cultivation, a more accurate signature of heroin production, consumption habits of heroin users, and trafficking flow patterns through Mexico and Canada. It is imperative that policymakers and the Congress fund additional data collection systems to make any real progress in developing reliable estimates that will contribute to reasoned shifts in policy and strategy.

Table 2: Significant action items generated by each Working Group.

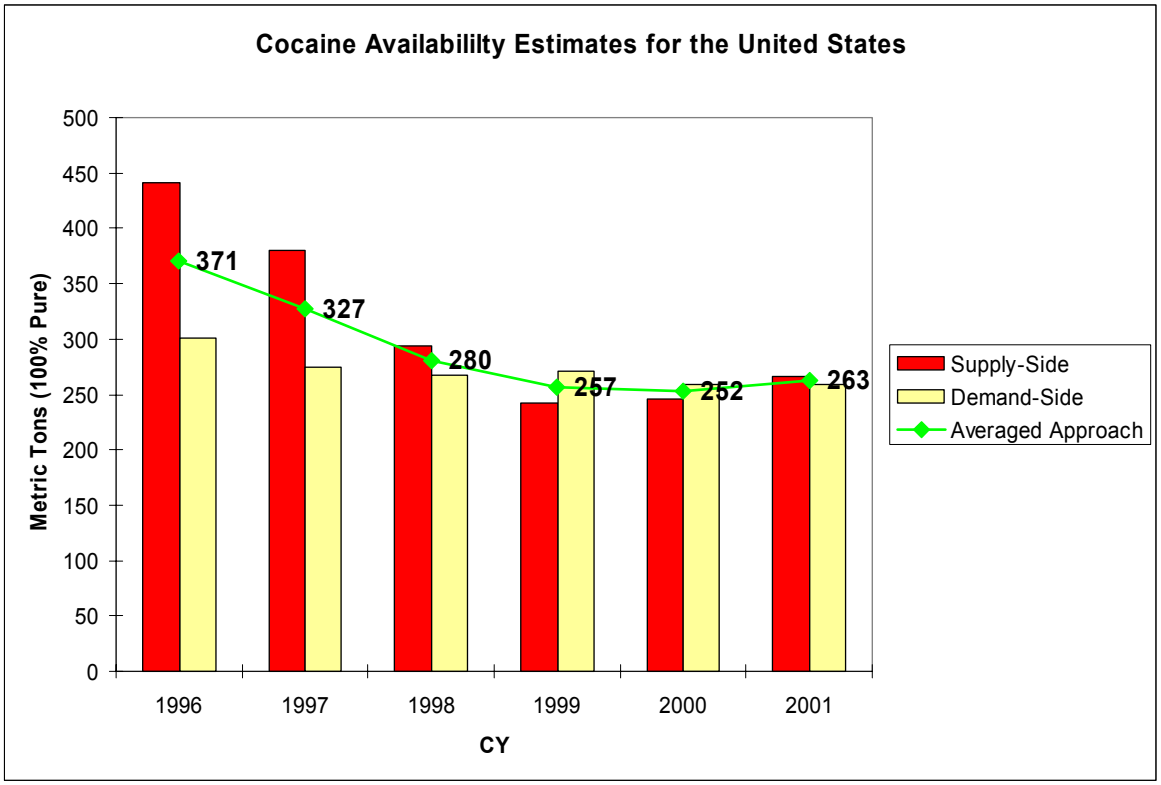
Office of Primary Responsibility	Significant Action Item
Cocaine	Expand estimates of cocaine purity throughout the market
Heroin	Improve production & HSP/DMP estimation methodologies
Methamphetamine	More accurately estimate legitimate and diverted US and Canadian ephedrine and pseudoephedrine
Marijuana	Develop signature program
Consumption	More accurately estimate number of drug users and their use behavior
Seizure	Institutionalize access to and cross-referencing of federal seizures; integrate state/local seizures

Chapter 1: Estimate of Cocaine Availability in the United States

Based on a the Department of Justice's Interagency Drug Flow Model Steering Committee tasking to estimate cocaine availability for the Calendar Year 2001, the Cocaine Working Group created a model for the estimation process and tested it across six years worth of data. This was done in anticipation of the need for complying with recurring annual estimates for 2002 and beyond. The main feature of the Working Group's model is the averaging of independent supply- and demand-side estimates to represent what we believe is the best point estimate of cocaine availability each year. This technique appears to have produced consistent results showing fairly narrow ranges of availability for the most recent four years, 1998-2001, within roughly a 5-10% spread annually between supply and demand estimates suggesting a stable availability during this four year time period, as shown in Figure 1-1.

Important conclusions to be derived from the modeling effort are the extent of uncertainty throughout the data sets and the importance of working to refine our estimates. While we believe that our combined estimative model provides a generally accurate point estimate for recent years, continued uncertainties in the available data sets and estimates make it difficult to accurately measure year-to-year changes in cocaine availability. Under the current conditions the best that can probably be done is to identify an overall availability trend rather than accurately measure the degree of change. To increase the accuracy of the various data sets over time, and allow us to correctly measure changes requires continued analytical focus on these data sets beyond completion of this task.

Figure 1-1 Cocaine Availability in the U.S.



Methodology Overview

The Cocaine Working Group was represented by members from the following organizations: Central Intelligence Agency (CIA), United States Customs Service (USCS), Defense Intelligence Agency (DIA) (Chair), Drug Enforcement Administration (DEA), El Paso Intelligence Center (EPIC), National Drug Intelligence Center (NDIC), Office of National Drug Control Policy (ONDCP), State Department, Treasury Department and United States Interdiction Coordinator (USIC). The working group developed a model that sequentially subtracted losses to the cocaine system from a starting point, as shown in Table 1-1. For the supply-side approach, the starting point was the averaged cocaine production estimate. Since the cocaine production estimate is expressed as pure cocaine (100% purity) and not in terms of the purity of real-life cocaine as it is manufactured from processing laboratories, a purity factor was applied based on the average wholesale purity of seized cocaine annually since 1998 to reflect more accurately the supply of cocaine. Consumption estimates for foreign markets were estimated and subtracted using 1998 as a base year, with updates from 2000 and extrapolated when data was not available for other years. Additionally, seizures around the world were subtracted. The residual from these subtractions produced the supply-side availability estimate. For the demand-side approach, estimates for domestic consumption were used as the residual without considering any losses. The residuals from both approaches were averaged and compared to show trends in availability.

Averaged Potential Production

The supply-side model sequence starts with the averaged potential cocaine production. Averaged potential cocaine production is the average of current year and past year official U.S. figures for potential cocaine production. The concept of averaging two production estimates is used because the official year-end estimate is not designed to calculate the total year's worth of cocaine production. These design limitations included in the year-end figure assume (1) that any eradicated plant did not produce prior to eradication, (2) that any mature coca plant imaged at the end of the calendar year was productive throughout the year and (3) that all coca leaf was harvested and processed into finished cocaine. To compensate for the first two issues, the working group decided to average two years of cocaine production estimates which would have the effect of minimizing the tendency to overestimate the productive capacity of immature coca plants at the beginning of the year and maximizing the tendency to underestimate the productive capacity of coca plants prior to eradication. The third issue is not quantifiable since it is impacted by parameters not currently measured and includes variations in weather, the timing of planting, harvesting decisions, and market demand

The official U.S. figures for year-end potential cocaine production are based on year-end estimates of net coca cultivation combined with estimates for coca yield, cocaine alkaloid content and cocaine processing factors. The formula and data for converting coca cultivation into year-end cocaine potential production are provided in Section 1-A for Colombia, Peru and Bolivia.

The four primary components of potential cocaine production are net coca cultivation, coca leaf yields, cocaine alkaloid content and cocaine processing efficiencies.

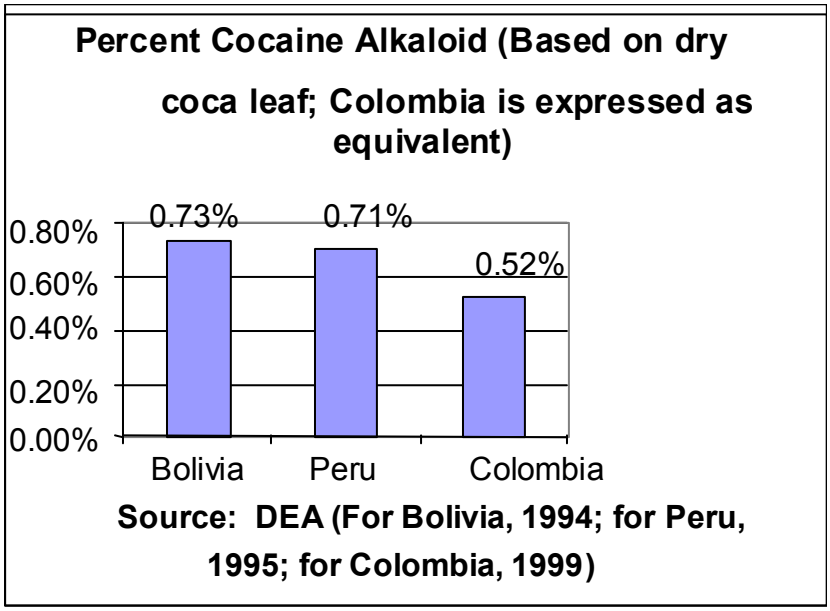
Estimates for coca cultivation are based primarily on satellite-imagery sampling within known growing areas normally imaged within a relatively narrow time period during a year. Because the sampling estimate is statistically based, the standard of error of the cultivation estimate can be determined. The error rate varies from year to year but averages about +/- 10 percent. The model

Table 1- 1 Worksheet showing model parameters, data, and results

Line	Adjustment	Purity	Calculation	1996	1997	1998	1999	2000	2001
1	Average Potential Production	Pure	See table 1-n	940	913	850	804	820	879
2	Average Purity of Exported Cocaine			0.86	0.86	0.86	0.84	0.82	0.78
3	Avg. Potential Production	EQ	Line 3= Lines (1)/(2)	1093	1062	988	957	1000	1127
4	Less seizures in Source Zone	EQ		75	81	90	77	85	78
5	Consumption in Source Zone	Pure		124	131	138	145	152	160
6	Less consumption in Source Zone	EQ	Line 6=Lines (5)/(2)	144	152	160	173	185	205
7	Est. available to depart Source Zone	EQ	Line 7= Lines (3)-(4+6)	874	828	738	708	730	844
8	Less seizures in non-US Transit Zone	EQ		0	0	0	11	7	18
9	Less seizures in non-US Arrival Zone	EQ		23	37	30	37	19	36
10	Consumption in Non-US Arrival Zone	Pure		138	146	153	161	183	192
11	Less consumption in non-US Arrival Zone	EQ	Line 11=Lines (10)/(2)	160	170	178	192	223	246
12	Estimate to depart Source Zone to US	EQ	Line 12=Lines (7)-(8+9+11)	690	622	530	468	484	544
13	Less seizures in US transit Zone	EQ		53	86	81	74	87	109
14	Less seizures in US Arrival Zone	EQ		85	54	66	56	43	34
15	Less federal seizures inside US	EQ		20	18	17	20	14	17
16	Less state and local seizures	EQ	Key data is missing	UNK	UNK	UNK	UNK	UNK	UNK
17	Consumption in transit Zone	Pure		17	19	21	25	30	33
18	Less consumption in Transit Zone	EQ	Line 17=Lines (17)/(2)	20	22	24	30	37	42
19	Estimate available for US consumption	EQ	Line 19=Lines (12)-(13+14+15+16+18)	513	441	342	288	300	341
20	Supply-side est. for US availability	Pure	Line 20=Line (19)*(2)	441	380	294	242	246	266
21	Demand-side estimate for US availability	Pure		301	275	267	271	259	259
22	Difference between two approaches	Pure	Line 22=Lines (18-19)	140	105	27	-29	-13	7
23	Point Estimates for US availability	Pure	Line 23=Lines (20+21)/2	371	327	280	257	252	263

compensated for limitations in the official U.S. cultivation figure resulting from the inability to image coca fields in Colombia's Narino Department in 2000. The yearend 2001 U.S. estimate for the Narino was about 12,100 hectares. The official U.S. estimate for 2000 acknowledged the existence of coca grown in Narino but did not quantify an amount because CNC was not able to complete a statistically significant survey there during that year. To compensate for the lack of vital information, the working group estimated, based on all available information—including United Nations Drug Control Policy (UNDCP)/Colombian government surveys for 1999 and 2000—that Narino had no coca at the end of 1998, 6,050 hectares of coca at the end of 1999, and about 12,100 hectares of coca at the end of 2000 and 2001.[1] Based on the appropriate leaf yield, alkaloid content, and base processing figures for Narino (Section 1-A), the working group estimated that potential cocaine production in Colombia was 537 metric tons at the end of 1999 (vice 520 metric tons) and 622 metric tons at the end of 2000 (vice 580 metric tons). Potential cocaine production at the end of 2001 already included an estimate for Narino so no changes are needed for that year for yearend potential production. Adjustments in yearend potential for 1999 and 2000 result in slightly higher "average" potential for 1998, 1999, 2000, and 2001.

Figure 1-2 - DEA Operation Breakthrough Data on the Percentage of Cocaine Alkaloid in Dry Leaf



The estimate for cocaine base processing efficiencies in Colombia was changed from about 45 percent to 69 percent as a result of DEA research published in Operation Breakthrough, February 2001. The higher efficiency factor has been applied to all estimates going back to 1995.

[1] UNDCP/Colombian government surveys using commercial satellite photography indicated that there were 3,959 hectares of coca in Narino in March 1999, 9,343 hectares there in August of 2000, and 7,494 there at the end of October 2001. Interpolating this data indicates that a little more than 6,000 hectares of coca could have been in the Narino by the end of 1999. If indeed, coca cultivation in the Narino declined in 2001—as indicated by the UNDCP/Colombian data—because of aggressive eradication efforts, that would mean that cultivation there at the end of 2000 would probably be at least as great as it was at the end of 2001.

Average Purity of Exported Cocaine

The model adjusts the averaged potential cocaine production number by wholesale purity, which was based on seizure samples greater than one kilogram or roughly two pounds. The reason for this factor is to accurately reflect the volume of cocaine departing illicit processing laboratories in South America. Changes in the purity level can also be used to help interpret changes in the cocaine system. The purity levels are calculated by averaging four calendar year quarters of cocaine samples analyzed through the Drug Enforcement Administration's Special Testing and Research Laboratory (STRL). Each quarter, cocaine samples are acquired through seizures of cocaine in South America and the United States.

The STRL began its purity level program in 1997 but an annual estimate for a purity level was not available until 1998 based on data starting in March 1998. The model assumed that the purity levels for 1997 and 1996 remained constant with the 1998 level. Other scenarios could have been assumed but there was no way to reasonably determine the magnitude in either direction, lower or higher. Section 1-A provides an explanation for the decline in purity detected since 1998.

The STRL does not use a statistical sampling process to calculate purity. Roughly a third of the total samples used for testing are foreign. About 94% of these samples come from non-Colombian cocaine seized primarily in Peru and Bolivia, even though current estimates indicate that over 90% of the cocaine entering the U.S. is Colombian cocaine. Since the last quarter of 2001, isotropic ratio analysis determined that over 90% of the cocaine exhibits seized in the United States and analyzed by DEA were of Colombian origin.

In addition, the STRL database does not provide a way to track intelligence-related information about the its domestic samples which comprise 2/3 of its testing, such as weight and seized location. This information would be helpful in better understanding the distribution of the domestic cocaine purity. Data from the STRIDE database, for example, shows dramatic variations in the purity of cocaine samples collected within the U.S. While the STRL database provides the name of each law enforcement laboratory where the sample originated, it does not provide a cross-reference number that could be used to find the original sample in the federal or state lab.

Cocaine Seizures

Cocaine seizures are used in the model and compiled by the following geographic categories: the Source Zone, Transit Zone, non-US Transit Zone, Arrival Zone, non-US Arrival Zone, U.S. federal seizures inside the U.S. and U.S. state and local seizures inside the U.S. The Source Zone is the continent of South America. The Transit Zone is the sovereign nations and the waterways between South America and the U.S., except for Puerto Rico and the U.S. Virgin Islands. The non-US Transit Zone is the sovereign nations and the waterways between South America and the Eastern Hemisphere, Oceania and Canada, except Puerto Rico and the U.S. Virgin Islands. The Arrival Zone is the land, air and maritime entry points along the borders of and within the U.S., Puerto Rico, and the U.S. Virgin Islands. The non-U.S. Arrival Zone is any country not included in the Source, Transit or U.S. Arrival zones, primarily the Eastern Hemisphere, Oceania and Canada. Cocaine seizures within the U.S. that are not part of the U.S. Arrival Zone are either collected by federal law enforcement agencies or state/local agencies.

Seizure data for all geographic areas except for state and local seizures are reviewed and stored in the United States Interdiction Coordinator-sponsored Counterdrug Consolidated Database (CCDB). The

CCDB contains a variety of information in addition to seizure data and for this reason is classified as National Security Information. The vast majority of seizure information in the CCDB is not National Security Information. Those seizures that contain classified information are not classified in themselves, rather the sensitive information refers to specific aspects of the seizure that are not relevant or needed to compile seizure statistics. All seizures in the CCDB are utilized for this model.

A subset of the data stored in the CCDB is also contained in the DEA's Federal Drug Seizure System (FDSS) database which contains all federal law enforcement seizures and some state and local seizures; however the CCDB is used as the compilation tool for global seizures. While CCDB is classified, accessible electronically, able to contain exhaustive information about a seizure and easy to use, FDSS is not classified but it is also not easily accessible, has limited data and is not easy to use.

Section 1-C provides a detailed listing of how the seizure information in Figure 1-2 was derived. The appendix also provides procedural information to replicate the aggregate data, assuming access to the CCDB and National Security Information is authorized.

While some state and local seizure data is available, a complete understanding of U.S. state and local cocaine seizures is not possible. For this reason, the model shows UNK (unknown) to reflect this lack of understanding. Only some state and local seizure data is available through a variety of databases, and the extent to which there is duplication or completeness in this data is unknown. There is therefore no reasonable estimate of the magnitude of U.S. state and local seizures.

Foreign Cocaine Consumption

Of the key factors needed to estimate cocaine availability in the U.S., foreign consumption estimates are the most imprecise. Prevalence and average-use parameters, which are key values for determining consumption, are difficult to estimate. Cocaine use estimates were base lined for 1998 and was based on data from many Latin American and European countries. Updated information in new surveys for 2000 allowed the working group model to interpolate estimates for 1999 and extrapolate for 2001. For the years 1997 and 1996, the model extrapolated backwards from the 1998 baseline.

Comprehensive cocaine prevalence studies have not been completed for most countries. For these, analytic judgment is used to adopt a comparable prevalence and use profile from those countries that have prevalence and use studies. Even where countries have published studies, they are often obsolete. More accurate information is needed about the size of the addict population in different countries and how much they consume. Section 1-D provides a detailed accounting for each country in the world.

U.S. Cocaine Consumption

Estimates for U.S. cocaine consumption are published periodically by ONDCP. The most recently published estimate from November 2001 provides an estimate for 1999 based on observed data and extrapolates for 2000 and 2001. Section 1-E provides insight into the components used to make the estimate.

U.S. consumption estimates have been made for about a decade using statistically reliable methodologies including epidemiological, econometric and price series analyses. However, many data shortfalls exist such as the reliability of the estimate of the number of hardcore users who consume the

vast amount of cocaine in the U.S. However, since U.S. estimates involve a consistent methodology, there is more confidence in trends than absolute amounts.

Model Interpretation

An important conclusion derived from the modeling effort is the extent of uncertainty throughout the data sets. While the model produces very useful ranges of cocaine availability for the U.S. for the years 1998-2001, the reader is cautioned that the underlying uncertainty discussed throughout this paper and appendices make drawing conclusions about year-to-year changes, such as increases or decreases, an unreasonable endeavor.

The trend for 1998-2001, using the average of the supply-side and demand-side approach, appears to decrease about 10% from 1998 to 1999, then decrease less than 1% from 1999 to 2000, and then increase about 5% from 2000 to 2001. However, these year to year changes are very small and could easily be caused by a variety of incompleteness or inaccuracies in a variety of the data. The four year trend from 1998-2001 yields a slight decrease of about 5%, from 280 to 265 metric tons of pure cocaine. The small yearly changes as well as the small four-year change suggest that cocaine availability in the U.S. throughout 1998-2001 has been relatively stable.

For years 1996-1997, the model was not able to produce useful results probably mostly because of the large extent of extrapolation of data rather than based on measured or available data. During 1996-97, the dramatic shift in coca cultivation from Peru to Colombia probably resulted in a higher-than-normal level of excess productive capacity as large numbers of Peruvian farmers abandoned their fields often without picking mature coca crops. The wholesale purity measurements did not exist because it wasn't until 1998 that these measurements were published. Foreign consumption estimates were not measured as they were based on backward extrapolation from 1998. Seizure data for 1996 did not undergo the reviewing and data basing process currently in place with the CCDB hence the reliability of seizures in that can not be confirmed. Finally, for all years, the absence of complete data for U.S. state and local seizures has some impact on magnitude estimates for availability; but based on a quick review of available state and local seizures in various databases, the working group believes the aggregate magnitude of these types of seizures is probably relatively low.

Recommendations for Improvement

Probably the most important suggestion for improvement is the need for open access to data and assumptions as well as continuing discussions about each parameter considered in the model: coca cultivation and cocaine production, purity levels, foreign and U.S. consumption estimates, and seizure statistics. Equally important is the continued analytical focus on these data sets. Some specific recommendations are:

1) Improve seizure accounting. The discussion of seizure accounting in the body of this report and the appendix is complicated but reflects the reality of how difficult it is to pull seizure data from many sources. Even then, there can be inherent inconsistencies such as calculation of U.S. arrival zone seizures.

2) Improve reporting of purity. The Working Group was not able to reproduce wholesale purities. For consistency, and interagency concurrence, this calculation needs to be transparent.

3) Improve foreign consumption estimates. The Working Group devoted an enormous amount of time and effort, building on previous analyses, to estimate foreign consumption but our allied partners need to share in this difficult task.

Appendix 1-A: Narcotics Crop Cultivation and Potential Cocaine Production Estimates

The US Government's narcotics crop and potential cocaine production estimates are comprised of several critical components: net mature coca cultivation; coca leaf yield per hectare per year; cocaine alkaloid content within the leaf; the efficiency with which the cocaine alkaloid in the leaf is converted into cocaine base; and the efficiency with which cocaine base is converted into pure cocaine hydrochloride. Those key components are multiplied together in the following equation in order to calculate potential pure cocaine production:

- Total mature[2] coca cultivation **X** coca leaf yield **X** leaf cocaine alkaloid content **X** base lab efficiency **X** base-to-HCL lab efficiency = *potential pure cocaine production* (see also Table 1-1, 1-2, and 1-3)

- Prior to the completion of research on Colombian coca yields and processing efficiencies, calculations of potential pure cocaine production were made using direct leaf to HCl conversion rates. For Peru and Bolivia, those direct conversion rates were determined using scientifically derived data on leaf yields, cocaine alkaloid contents, and laboratory efficiencies[3].

Estimates of potential cocaine production are not the same as actual production:

- Estimates assume that the regions' farmers harvest all of the coca leaf and that all the harvest is processed. No attempt is made to quantify spoilage or loss from seizure or by other means.

- Estimates of potential cocaine production are measurements of production based on a product with a purity of 100 percent.

- And finally, potential production estimates are based on the end of the calendar year net coca cultivation estimate. Actual potential production during the year will depend, in part, on the rate of change of potential production from one years year-end estimate to another.

Colombia Potential Production Calculations 1996-2001

This section tabulates the cultivation, leaf production, and potential Hydrochloride (HCl) production estimates for each Colombian growing area. The base lab processing efficiency for Colombia is 69.4%, based on Operation Breakthrough analyses. The overall average efficiency of cocaine base to cocaine HCL is 88 percent; this translates into approximately a 1:1 conversion rate based on weight. For the other two components applied to the Colombian cultivation data, leaf yield and cocaine alkaloid content, Table 1-2 shows the values, based on fresh coca leaf. Tables 1-3, 1-4, and 1-5 show the potential production figures for 2000-01, 1998-99, and 1996, 97 respectively.

---

[2] When calculating potential production, only mature cultivation is considered. Since almost all farmers interviewed in Colombia reported that they plant their fields using cuttings and pick their first harvest within one year of planting, all of Colombia's crop is considered mature. In Peru and Bolivia, it generally takes between 18 - 24 months for newly planted fields to become productive. Therefore, new cultivation observed during the year is not considered mature for two years.

[3] For example, in Peru, it was determined that roughly 400 kilos of air-dried coca leaf was required to produce one kilo of pure cocaine while in Bolivia, processors required anywhere from 310 to 370 kilos of air-dried coca leaf to produce one kilo of pure cocaine. In addition, in Peru potential production estimates were calculated on total country-wide estimates of air-dried leaf production and not by individual growing areas.

Table 1- 2 Leaf Yield and Cocaine Alkaloid Content Data for Columbian Growing Area

GROWING AREA	Fresh coca leaf yield (mt/ha/yr)	Fresh leaf cocaine alkaloid content
Guaviare	4.7	0.149%
Vichada	4.7	0.149%
Macarena	4.7	0.149%
Putumayo East [1]	4.7	0.149%
Caqueta East	4.7	0.149%
Puerto Leguizamo [1]	4.7	0.149%
Caqueta West	4.1	0.139%
San Lucas	4.1	0.139%
Putumayo	3.9	0.136%
Norte de Santander	3.9	0.136%
Arauca [2]	3.9	0.136%
Narino	3.9	0.136%
Antioquia	3.9	0.136%

Notes:
1. Beginning in 2001, Putumayo East includes the area around Puerto Leguizamo
2. Prior to 2000, fresh coca leaf yield in Arauca was judged to be 4.7 mt fresh leaf/ha/year while cocaine alkaloid content was judged at 0.149%; those data points were updated in 2001 after further analysis.

Table 1- 3 Total Pure Cocaine Production for Columbia, 2000-2001

GROWING AREA	2000			2001		
	Net Mature Cultivation (ha)	Fresh Leaf production (mt)	Potential pure cocaine production (mt)	Net Mature Cultivation (ha)	Fresh Leaf production (mt)	Potential pure cocaine production (mt)
Guaviare [1]	36,100	169,670	175.4	51,600	242,520	**250.8**
Vichada				2,600	12,220	**12.6**
Macarena	2,100	9,870	10.2	2,500	11,750	**12.2**
Putumayo East	2,500	11,750	12.2	2,600	12,220	**12.6**
Caqueta East	19,100	89,770	92.8	25,300	118,910	**123**
Caqueta West	13,100	53,710	51.8	15,000	61,500	**59.3**
San Lucas	8,400	34,440	33.2	4,400	18,040	**17.4**
Putumayo	44,900	175,110	165.3	39,400	153,660	**145**
Norte de Santander	8,100	31,590	29.8	9,300	36,270	**34.2**
Arauca	1,900	7,410	7.0	3,800	14,820	**14**
Antioquia				1,200	4,680	**4.4**
Narino				12,100	47,190	**44.5**
Totals	**136,200**	**583,320**	**577.8 (580)**	**169,800**	**733,780**	**730.1 (730)**
Narino adjust [2]	12,100	47,190	44.5			
Totals	**148,300**	**630,510**	**622.3 (622)**			

Notes: 1. Prior to 2001, Vichada had been included in the Guaviare growing region.
2. Estimate from UNDCP/Colombian government analysis of commercial satellite imagery.

Table 1- 4 Total Pure Cocaine Production for Columbia, 1998-1999

GROWING AREA	1998			1999		
	Net Mature Cultivation (ha)	Fresh Leaf production (mt)	Potential pure cocaine production (mt)	Net Mature Cultivation (ha)	Fresh Leaf production (mt)	Potential pure cocaine production (mt)
Guaviare	26,700	125,490	129.8	28,000	131,600	136.1
Macarena				1,800	8,460	8.7
Caqueta East	17,900	84,130	87.0	19,000	89,300	92.3
Caqueta West	21,500	88,150	85.0	14,600	59,860	57.7
San Lucas	2,800	11,480	11.1	4,100	16,810	16.2
Putumayo	30,100	117,390	110.8	45,900	179,010	169.0
Norte de Santander	2,800	10,920	10.3	8,000	31,200	29.4
Arauca				1,100	5,170	5.3
Totals	**101,800**	**437,560**	**434.0 (435)**	**122,500**	**521,410**	**514.9 (520)**
Narino adjust [1]				6,050	23,595	22.3
Totals				**128,550**	**545,005**	**537.2 (537)**

Notes: 1. Estimate from UNDCP/Colombian government analysis of commercial satellite imagery.

Table 1- 5 Total Pure Cocaine Production for Columbia, 1996-1997

GROWING AREA	1996			1997		
	Net Mature Cultivation (ha)	Fresh Leaf production (mt)	Potential pure cocaine production (mt)	Net Mature Cultivation (ha)	Fresh Leaf production (mt)	Potential pure cocaine production (mt)
Guaviare	38,600	181,420	187.6	29,000	136,300	140.9
Caqueta East	9,350	43,945	45.4	13,100	61,570	63.7
Caqueta West	12,250	50,225	48.5	18,400	75,440	72.8
Putumayo	7,000	27,300	25.8	19,000	74,100	69.9
Totals	**67,200**	**302,890**	**307.3 (300)**	**79,500**	**347,410**	**347.3 (350)**

Peru and Bolivia Potential Production Calculations 2000-2001

This section will tabulate the cultivation, leaf production, and potential HCl production estimates for each Peruvian and Bolivian growing area. The base lab processing efficiency for Peru is 44%, and is 45% for Bolivia, based on Operation Breakthrough analyses. The overall average efficiency of cocaine base to cocaine HCL is 88 percent; this translates into approximately a 1:1 conversion rate based on weight. For the other two components applied to the Peruvian and Bolivian cultivation data, leaf yield and cocaine alkaloid content, table 6 shows the values, based on oven-dried coca leaf. Tables 7 and 8 show the 2000-01 data for Peru and Bolivia. Note that the Bolivia figures for 2000-01 are mid-year estimates.

Table 1- 6 Leaf Yield and Cocaine Alkaloid Content Data for Peru and Bolivia

Country	Growing Area	Oven-dried coca leaf yield (mt/ha/yr)	Oven-dried cocaine alkaloid content
Peru	*Lower Huallaga Valley (LHV) Central Huallaga Valley (CHV)*	1.2	0.71%
	Aguaytia & Pachitea	1.6	0.71%
	Upper Huallaga Valley (UHV)	1.8	0.73%
	Apurimac	2.2	0.65%
	Cusco	0.8	0.75%
	Other	1.0	0.71%
Bolivia	*Chapare*	2.3	0.72%
	Yungas	0.8	0.84%
	Other	0.8	0.84%

Table 1- 7 Total Pure Cocaine Production for Peru, 2000-2001

GROWING AREA	2000				2001			
	Net Cultivation (ha)	Net Mature Cultivation (ha)	Oven-dried Leaf production (mt)	Potential pure cocaine production (mt)	Net Cultivation (ha)	Net Mature Cultivation (ha)	Oven-dried Leaf production (mt)	Potential pure cocaine production (mt)
LHV/CHV	1,900	1,000	1,200	3.7	1,000	1,000	1,200	3.7
Aguaytia & Pachitea	2,200	1,000	1,600	5.0	1,000	1,000	1,600	5.0
UHV	12,200	10,700	19,260	61.9	13,700	10,700	19,260	61.9
Apurimac	7,500	6,700	14,740	42.2	8,500	6,500	14,300	40.9
Cusco	7,400	7,100	5,680	18.7	7,400	6,900	5,520	18.2
Other	3,000	3,000	3,000	9.4	2,400	2,400	2,400	7.5
Totals	**34,200**	**29,500**	**45,480**	**140.9 (145)**	**34,000**	**28,500**	**44,280**	**137.2 (140)**

Table 1- 8 Total Pure Cocaine Production for Bolivia, 2000-2001 (mid-year)

GROWING AREA	2000				2001			
	Net Cultivation (ha)	Net Mature Cultivation (ha)	Oven-dried Leaf production (mt)	Potential pure cocaine production (mt)	Net Cultivation (ha)	Net Mature Cultivation (ha)	Oven-dried Leaf production (mt)	Potential pure cocaine production (mt)
Chapare	5,600	5,000	11,500	37.3	4,200	2,000	4,600	14.9
Yungas	13,700	13,100	10,480	39.6	15,300	14,500	11,600	43.8
Other	300	300	240	0.9	400	300	240	0.9
Totals	**19,600**	**18,400**	**22,220**	**77.8 (80)**	**19,900**	**16,800**	**16,440**	**59.7 (60)**

Peru and Bolivia Potential Production Calculations 1996-1999

As mentioned earlier, prior to the completion of research on Colombia coca yields and processing efficiencies, calculations of potential pure cocaine production were made using conversion rates. For Peru and Bolivia, those conversion rates were determined using scientifically derived data on leaf yields, cocaine alkaloid contents, and laboratory efficiencies. Table 9 shows the leaf yield and conversion rates, which are based on air-dried leaf, for Peru and Bolivia over the period 1996-1999.

Table 1- 9 Leaf Yield and Conversion Data for Peru and Bolivia

Country	Growing Area	Air-dried coca leaf yield (mt/ha/yr)	Air-dried leaf: HCl Conversion (mt leaf/mt HCl)
*Peru**			**400:1**
Bolivia	*Chapare*	2.7	**370:1**
	Yungas - Other	1.0	**313:1**

* In Peru up until 2000, potential production estimates were calculated on total country-wide estimates of air-dried leaf production (400:1) and not by individual growing areas.

Table 1- 10 Total Pure Cocaine Production for Peru, 1998-1999

GROWING AREA	1998			1999		
	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)
LHV/CHV				2,000	1,700	2,500
LHV	1,000	1,000	1,300			
CHV	1,100	1,100	1,800			
Aguaytia	4,800	4,800	8,200			
Pachitea	1,300	1,300	2,700			
Aguaytia Pachitea				1,900	1,500	3,000
UHV	21,000	21,000	44,100	15,200	14,800	31,100
Apurimac	9,000	9,000	24,300	8,100	7,800	21,100
Cusco	7,500	7,500	6,800	7,500	7,400	6,700
Other	5,300	5,300	6,400	4,000	4,000	4,800
Totals	**51,000**	**51,000**	**95,600**	**38,700**	**37,200**	**69,200**

Table 1- 11 Total Pure Cocaine Production for Peru, 1996-1997

GROWING AREA	1996			1997		
	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)
LHV	5,000	5,000	6,500	2,800	2,800	3,600
CHV	5,000	5,000	8,000	2,500	2,500	4,000
Aguaytia	15,000	15,000	25,500	8,400	8,400	14,300
Pachitea	6,200	6,200	13,000	2,200	2,200	4,600
UHV	29,400	29,400	60,300	25,000	25,000	52,500
Apurimac	16,800	16,800	43,700	12,600	12,600	35,300
Cusco	9,000	9,000	8,100	8,300	8,300	7,500
Other	8,000	8,000	9,600	7,000	7,000	8,400
Totals	**94,400**	**94,400**	**174,700**	**68,800**	**68,800**	**130,200**

The potential production estimates for Peru were then calculated by dividing the sum of the leaf productions for each growing area and dividing by the 400:1 conversion factor. Table 1-12 below shows the calculated and reported figures.

Table 1- 12 Total Pure Cocaine Production for Peru, 1996-1999

Year	Air-dried Leaf production (mt)	Potential pure cocaine production (mt)
1996	174,700	437 (435)
1997	130,200	326 (325)
1998	95,600	239 (240)
1999	69,200	173 (175)

The potential production figures for each Bolivian growing area, over the 1996-1999 period are shown below.

Table 1- 13 Total Pure Cocaine Production for Bolivia, 1998-1999

GROWING AREA	1998				1999			
	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)	Potential pure cocaine production (mt)	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)	Potential pure cocaine production (mt)
Chapare	23,500	14,300	38,600	105	7,500	3,400	9,000	25
Yungas - Other	14,500	14,300	14,300	45	14,300	13,800	13,800	45
Totals	**38,000**	**28,600**	**52,900**	**150**	**21,800**	**17,200**	**22,800**	**70**

Table 1- 14 Total Pure Cocaine Production for Bolivia, 1996-1997

GROWING AREA	1996				1997			
	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)	Potential pure cocaine production (mt)	Net Cultivation (ha)	Net Mature Cultivation (ha)	Air-dried Leaf production (mt)	Potential pure cocaine production (mt)
Chapare	33,000	22,700	61,300	165	31,500	20,800	56,200	150
Yungas - Other	15,100	13,800	13,800	45	14,300	13,900	13,900	45
Totals	**48,100**	**36,500**	**75,100**	**210 (215)**	**45,800**	**34,700**	**70,100**	**195 (200)**

Table 1- 15 Andean Cultivation and Potential Pure Cocaine Production, 1995-2001

	1995	1996	1997	1998	1999	2000	2001
Bolivia							
Net cultivation (ha)	48,600	48,100	45,800	38,000	21,800	19,600	19,900
Potential pure cocaine production (mt)	240	215	200	150	70	80**	60**
Colombia							
Net cultivation (ha)	50,900	67,200	79,500	101,800	122,500	136,200	169,800
Potential pure cocaine production (mt)	230	300	350	435	520	580	730
*Potential pure cocaine production (mt)**					537*	622*	
Peru							
Net cultivation (ha)	115,300	94,400	68,800	51,000	38,700	34,200	34,000
Potential pure cocaine production (mt)	460	435	325	240	175	145	140
Andean Total							
Net cultivation (ha)	214,800	209,700	194,100	190,800	183,000	190,000	223,700
Potential pure cocaine production (mt)	930	950	875	825	765	805	930
*Potential pure cocaine production (mt)**	930	950	875	825	782*	847*	930
Potential pure cocaine production Two-year average (mt)		940	913	850	804*	820*	879

* including the Narino adjustment for 1999 and 2000
** Bolivia 2000 and 2001 estimates are mid-year estimates.

Appendix 1-B: Wholesale Cocaine Purity Trends

The purpose of this appendix is to explain the four-year declining trend in purity of wholesale-level cocaine. We have discovered that the explanation for the decrease is complex. Fundamentally, the cumulative effect of increasing world demand on a changing but stable supply of cocaine has pressured traffickers to decrease purities to bridge the gap. Other factors have also been at play: interdiction of precursor chemicals and taxes imposed on coca growers by insurgents. In the absence of aggressive demand reduction efforts, especially in expanding markets, cocaine purities will probably continue to fall marginally overtime as eradication and interdiction prevent supply from matching demand.

Wholesale Cocaine Purity Estimates

Wholesale-level purity refers to cocaine leaving HCl labs in South America, typically in one-kilogram bricks or larger, that is transiting to various world markets, but has not yet been subdivided for sale at the local retail level. Purity is an important variable in a complex system of product supply and market demand.

Wholesale cocaine purity calculations based on chemical analysis of seized cocaine indicate a steadily declining trend for the past four years, from an average of 86% pure in 1998 to 78% pure in 2001 and to 76% pure during the first quarter of 2002. These purity figures are calculated by the DEA Cocaine Signature Program (CSP) in their STRL. Purity calculations have been available since the beginning of 1998. The quarterly reports are calculated by averaging the purity of hundreds of samples, about two thirds of them taken from cocaine bricks (1 kilogram or larger) seized in the United States and the remaining third from foreign locations, mostly South America[1].

The most recent DEA CSP report (1st quarter 2002) indicates that over one half of all cocaine bricks leaving source zone labs are now being cut with diluents. At the end of 2000, about a third of all samples were diluted, which at that time was a significant increase from previous years. In addition to the deliberate adulteration of the cocaine, DEA chemical analysis of samples revealed that illicit cocaine laboratories in Colombia are using significantly reduced amounts of the required essential solvents for processing, often skipping the use of one of the two key solvents in the final step of cocaine HCl processing. Traffickers are also increasingly beginning the cocaine HCl processing phase with unpurified cocaine base, skipping or minimizing the oxidation of the cocaine base and beginning HCl processing with a lower purity.

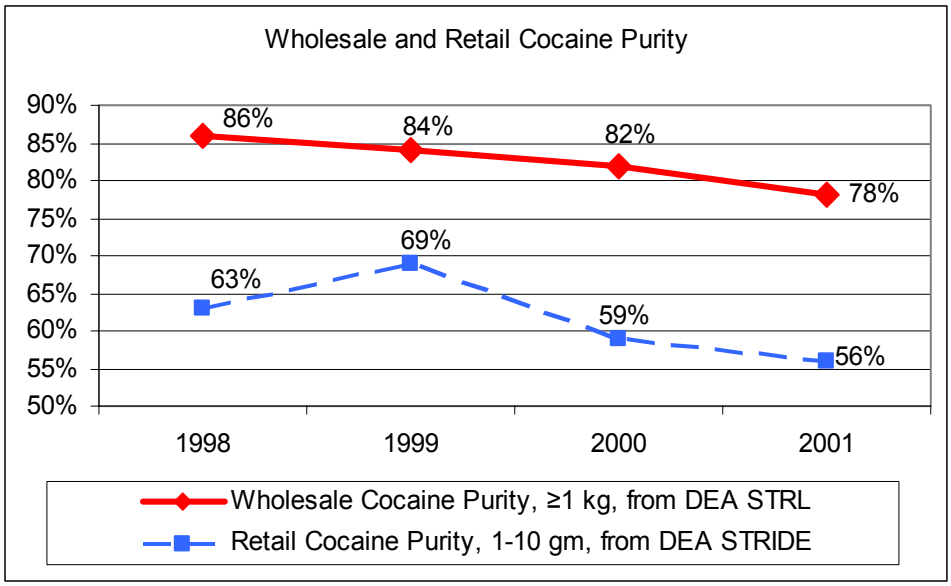
According to DEA System to Retrieve Drug Evidence (STRIDE) data, retail purity of cocaine in the United States has decreased during the same time period as wholesale purity. The declining trend in retail purity appears to be consistent with the declining trend in wholesale purity.

Possible Explanations of Decreased Cocaine Purity

We assess that the fundamental cause for decreased cocaine purity is that Andean cocaine supplies have failed to keep up with expanding international demand. As a result of competition for limited supplies, traffickers have been motivated to "stretch" their product and/or maximize profits by adding diluents at cocaine HCl labs. Two primary dynamics are assessed to be at play. First, traffickers are operating in the face of a very complex balancing act in dealing with supply-related changes in coca growth patterns, plant varieties, and cocaine processing that has been taking place throughout the Andean region since at least 1996. Secondly, at the same time, traffickers are accommodating a growing non-U.S. and net global market, which, in conjunction with the first dynamic, is resulting in an insufficient global

supply. The pressures of increasing demand on a constrained and adapting supply have ultimately resulted in lower purity.

Figure 1-3 - Purity of Wholesale Cocaine destined to the U.S. and Retail Cocaine in the U.S., 1998-2001



Supply Flat

Over the past ten years, the total amount of coca supply in the system has been relatively stable because of aggressive supply-reduction measures only partially offset by higher cocaine processing efficiencies in Colombia. Despite stable production, however, there have been dramatic changes within the supply system, dating back to at least 1995. Eradication and abandonment have resulted in significantly less coca grown in Peru and Bolivia, but similar policies have failed to slow the expansion of coca cultivation in Colombia. In Colombia, moreover, there has also been a change in the type of coca plant grown, from a single variety grown in the lowlands to two varieties, one grown in the upland areas and the other in the lowland areas with the upland variety allowing traffickers to expand cultivation over a greater geographic area and a wider variety of terrain. More importantly, changes in cocaine base processing in Colombia have also taken place -- from a largely manual effort to a more efficient, machine-assisted process using wet leaves -- which has had the effect of increasing production, but not necessarily altering purity.

Demand Increasing

Beginning in 1990 and continuing to the present, changes in the global cocaine market have taken place, both in market locations and total demand. Consumption has increased most notably in South America and Europe. In 1990, global consumption was probably around 500 metric tons, of which the United States consumed about 400 metric tons. By 2001, global consumption had increased to more than 600 metric tons, while U.S. consumption had dropped to about 260 metric tons.

Andean coca price trends seem to corroborate the conclusion that eradication and interdiction have helped prevent cocaine supplies from matching increased international demand. In Peru and

Bolivia, where eradication and interdiction have been most effective, licit and illicit coca prices have risen to record levels – more than twice the norm. In turn, the record prices are encouraging coca farmers in Peru and Bolivia to try to expand cultivation to match demand. In Colombia, the rapid expansion of cultivation – in the face of aggressive eradication and interdiction efforts – is clear evidence that prices there have remained high and that supply there also lags demand.

Other Causes

Other factors have also been at play: interdiction of precursor chemicals and taxes imposed on coca growers by insurgents. During the past several years, Colombian traffickers have faced aggressive efforts to restrict and intercept essential chemicals used in cocaine processing. Although we lack reporting on the impact of interdiction efforts on the supply of chemicals, significant amounts of chemicals have been seized. Efforts to restrict potassium permanganate have been especially aggressive. Increased difficulty in obtaining this oxidizing agent – which is highly efficient in precipitating non-cocaine alkaloids – may have contributed to traffickers' increased use of unpurified cocaine base. As a result, traffickers appear to have lowered their standards for refined cocaine and in some cases are exporting cocaine without the benefit of the total package of traditional purifying solvents.

The deliberate adulteration (cutting) of product by traffickers may also be an attempt to maintain profits in the face of rising costs in recent years. For example, the total revenue from taxes and fees paid to guerrilla forces has probably expanded continually as both the FARC and AUC aggressively move to control markets. The implementation of Plan Colombia has almost surely increased security-related operating costs. Finally, Colombia's ongoing recession has probably encouraged some traffickers to boost trafficking profits to offset losses elsewhere.

Looking Ahead

In the absence of aggressive demand reduction efforts, especially in expanding markets, cocaine purities will probably continue to fall marginally overtime as eradication and interdiction prevent supply from matching demand. Assuming growers and traffickers are concerned about the potential effects of declining purity trends on their profits, the most viable strategy for them will be to make every effort to increase the global coca supply. As long as supplies remain constrained, local prices are likely to remain near record levels for Andean coca, motivating growers and traffickers to continue to expand cultivation in Colombia and also expand cultivation in Peru and Bolivia.

On the demand side, we expect consumers to react to a continuing marginal decline in purity levels the same as they would to a more explicit price increase. Our lack of a clear understanding of market dynamics and demand elasticities, however, complicates our ability to predict overall demand changes and consequent trafficker adaptations. That said, we expect the impact of declining purity would be felt differently in the various world markets. Lower purities would have most impact on potential first-time or recreational users. In contrast, hardcore addicts would be more likely to try to boost purchases to satisfy their needs.

[1] Although CSP data is the best available at the present time, it is important to note the limitations of estimates that are based on this data. Because samples are only available when seizures are made, the sampling technique is not statistically random. Thus, the estimates derived from the average of these samples may not be a precisely accurate indicator of the purity of all wholesale cocaine. We know, for example, from DEA's System to Retrieve Drug Evidence (STRIDE) database that purity varies significantly by size of sample and location of seizure. Despite these concerns, the large number of samples (over 2,000 per year) likely provides an accurate depiction of the trends in cocaine purity over time.

Appendix 1-C: Cocaine Seizure Data

The seizure figures used in this study come from the CCDB, an interagency classified database maintained by the USIC. The only exception to the CCDB data is Internal US Federal seizures, which are calculated by subtracting CCDB from the FDSS, an interagency law enforcement database which is maintained by the DEA.

Because the structure of the CCDB is designed to describe drug movement rather than seizure trends, some specific reorganization and additional coding are necessary to present seizure data so that the amounts are consistent from one query to the next. A list of the steps performed on the CCDB and FDSS to extract and calculate the seizure data is provided below, followed by a tabular breakdown by country within the respective categories.

Procedure for extracting cocaine seizure data from the Transit Zone events in the CCDB

1. The most current copy of the annual CCDB transit zone excel file is retrieved from the WebShare CCDB Forum located on a classified network environment.

2. Sort the spreadsheet by the field "cocaine base amount seized." For any non-zero amount in "cocaine base amount seized, copy the number into the "cocaine amount seized" field. (Leave the "cocaine total amount" field blank) If there is already a number in the "cocaine amount seized" field, add both numbers together.

3. Sort the spreadsheet by the field "cocaine amount seized" and delete all events with null and zero entries in this field.

4. Copy the fields "Corridor" and "Interdiction Country" and insert them into columns A and B respectively. Rename these fields "Seizure Corridor" and "Seizure Country" respectively. Sort on Seizure Corridor; sub-sort on Seizure Country.

5. Begin at the top of the Seizure Country field. As you move down the column, identify any Seizure Country that is not physically located in the Seizure Corridor to its left (e.g. a Seizure Country of HA in the US corridor or a Seizure Country of RQ in the Carib Corridor). Change the Seizure Corridor to coincide with the Seizure Country (e.g. Seizure Country HA should be in Seizure Corridor CARIB and Seizure Country RQ should be in Seizure Corridor US). If the Seizure Corridor is other than MXCA, CARIB, US or Non-US (e.g. UNK or blank), place it in the correct corridor. If the Seizure Country is in the source zone (South America), enter "SZ" in the Seizure Corridor field.

6. Any Seizure Country codes beginning with MX (e.g. MXSO) should be replaced with MX only.

7. Identify any Seizure Country fields that are blank. These should be filled in with "high seas" to identify seizure that did not occur in the sovereign territory of any nation.

8. For the Non-US corridor, for each seizure country, determine whether it is in the Non-US Arrival Zone (all except LATAM, MX, Carib and high seas) or Transit Zone to Non-US (LATAM, MX, Carib and high seas). If it is Non-US Arrival Zone, change the Seizure Corridor to "Non-US AZ." If it is Transit Zone to Non-US, change the Seizure Corridor to "Non-US TZ."

9. For the US Corridor, review the Seizure Country and place each event into one of four new Seizure Corridor categories: US_SWB, US_EC, US_RQVQ or US. US_SWB includes the states of CA, AZ, NM, and TX; US_EC includes all states that have an Atlantic coast; US_RQVQ includes RQ and VQ; and US includes all else.

10. At this point, there are two options for calculating the totals.
    a. Pivot Table: Construct a pivot table using Seizure Corridor and Seizure Country as the two vertical fields. Put "Cocaine Amount Seized" in the data label area and select "sum". You can click on any total in the pivot table to view a worksheet with the events displayed.
    b. Subtotals: Sort the main data worksheet on Seizure Corridor and then on Seizure Country. Select subtotals from the data menu and choose Seizure Corridor, sum and the Cocaine Amount Seized fields. Next, select subtotal again. Choose Seizure Country, sum and Cocaine Amount Seized fields and deselect replace subtotals. You will have to scroll to the Cocaine Amount Seized field to view the subtotals.

Table 1- 16 Seizures in Transit Zone to the United States: Seizure Totals (in kilograms) by Corridor and Country, CY2001

	Aruba	10.796
	Anguilla	846
	Barbados	10
	Bermuda	60
	Bahamas	2116.569
	Cuba	0.9
	Curacao	4.18
	Dominica	0.5
	Dominican Republic	1132.266
	Dutch Saint Martin	134.74
	French Saint Martin	6
	Grenada	33
	Haiti	327
	High Seas	11014.95
	Jamaica	2445.017
	Netherlands Antilles	11
	St. Kitts and Nevis	19.34
	St. Lucia	23
	Trinidad and Tobago	714.8
	St. Vincent and Grenadines	273.5
	British Virgin Islands	1276
Caribbean Total		20459.56
Mexico*		11222.15
MX/CA High Seas		61855.9
	Belize	4997.714
	Costa Rica	1406.363
	El Salvador	5
	Guatemala	3814.5
	Honduras	170
	Nicaragua	3392
	Panama	3269.62
Central America Total		17055.2
Transit Zone Total**		110592.8

* This total is 1 MT larger than an earlier published figure because a 1.2 MT seizure was discovered in the CCDB that had not previously been assigned an "interdiction country" value and thus was not counted. The seizure occurred in Mexico.

** This total is higher than an earlier published figure for the same reason noted above regarding the Mexico figure. Also, when the subtotals are rounded for the table and then summed, they add up to 110 MT, which is different than if you rounded the total using after adding figures to three decimal places.

Table 1- 17 Seizures in Transit Zone to Non-US Destinations: Seizure Totals (kilograms) by Country, CY2001

	Aruba	3.5
	Barbados	20.3
	Bermuda	585
	Costa Rica	30.42
	Cuba	3.047
	Curacao	23
	Cape Verde	7.1
	Dominican Republic	9
	Grenada	24.85
	Guatemala	8
	Haiti	8
	High Seas	16522.6
	Jamaica	318.61
	Martinique	9.17
	Nicaragua	1069
	Panama	118.2
	St. Lucia	31.15
	Trinidad and Tobago	38.7
	St. Vincent and Grenadines	1.5
Transit Zone to Non-US Total***		18831.15

*** A more accurate division of countries between the Non-US Arrival Zone and the Transit Zone to Non-US resulted in 1 MT of seizures that were previously counted in the Non-US Arrival Zone being moved to the Transit Zone to Non-US.

Table 1- 18 U.S. Arrival Zone Seizure Totals (kilograms) by Region and State, CY2001

	IL	20.836
	IN	1.996
	KY	4
	LA	7
	OH	27.627
	OR	31.7
	TN	207.299
	WA	35.19
Other US Total		335.648
	US	35
	DC	14.858
	DE	2.7
	FL	6859.28
	GA	520.565
	MA	1.705
	MD	172.475
	NC	16.271
	NJ	360.114
	NY	721.728
	PA	26.09
	SC	49.5
US East Coast Total		8780.286
	Puerto Rico	4842.874
	USVI	779.37
Puerto Rico/USVI Total		5622.244
	AZ	2772.67
	CA	4370.831
	NM	157.558
	TX	12356.79
US Southwest Border Total		19657.85
US Arrival Zone Total		34396.02

Table 1- 19 Non-U.S. Arrival Zone Seizure Totals (kilograms) by Country, CY 2001

	Angola	9
	Austrailia	1296.9
	Austria	51.5
	Belgium	1670
	Benin	30
	Belarus	3
	Bulgaria	12.61
	Canada	909.2
	China	2
	Denmark	4.952
	Ireland	4
	Czech Republic	2.8
	Fiji	2.1
	France	1526.765
	Germany	723.723
	Greece	246.4
	Hong Kong	26.3
	Hungary	2
	Indonesia	15
	Israel	9
	Italy	248.365
	Japan	17.3
	Macedonia	3.815
	Morocco	8
	Malta	2.2
	Montenegro	1
	Nigeria	81.353
	Netherlands	1270.737
	Norway	4
	Poland	4
	Portugal	3502.22
	Philippines	2
	Russia	1.15
	South Africa	319.2
	Spain	20774.82
	Serbia	1.136
	Sweden	34.6
	Switzerland	3.6
	United Arab Emirates	3
	Thailand	1.5
	Tonga	100
	United Kingdom	1895.827
NON-US Arrival Zone Total***		34827.07

Procedure for extracting cocaine seizure data from the Source Zone CCDB

1. The most current copy of the annual CCDB source zone excel file is retrieved from the WebShare CCDB Forum.

2. Sort the spreadsheet by the fields "cocaine paste amount seized" and "cocaine amount seized" and delete all events with null and zero entries in both of these fields. Then sort on date and delete all events not made in the year in question.

3. Copy the field "Interdiction Country" and insert in into column A. Rename this field "Seizure Country". Sort on Seizure Country.

4. At this point, there are two options for calculating the totals.
    a. Pivot Table: Construct a pivot table using Seizure Country as the vertical field. Put "Cocaine Paste Amount Seized" and "Cocaine Amount Seized" in the data label area and select "sum" for both. You can click on any total in the pivot table to view a worksheet with the events displayed. On the right of the pivot table, you can enter formulas so that the spreadsheet will add the base and HCl amounts. You can also enter a column for amounts from the TZ spreadsheet and sum them in the spreadsheet.
    b. Subtotals: Sort the main data worksheet on Seizure Country. Select subtotals from the data menu and choose Seizure Country, sum and the Cocaine Paste Amount Seized and Cocaine Amount Seized fields. You will have to scroll to the Cocaine Paste Amount Seized and Cocaine field to view the subtotals. Totals from the TZ spreadsheet will have to be added in manually.

Table 1- 20 Source Zone Seizure Totals (kilograms) by Country, CY2001

Seizure Country	Cocaine Base	Cocaine HCl	Total
Argentina	3	372.427	375.427
Bolivia	520.718	431.13	951.848
Brazil	7.9	2640.86	2648.76
Chile	391.047	798.74	1189.787
Colombia	7035.351	29177.79	36213.14
(from SZ Data)	7035.351	25191.79	
(from TZ Data)		3986	
Ecuador	1061.871	10124.998	11186.87
Guyana		37.486	37.486
Suriname		1484.39	1484.39
Paraguay		342.642	342.642
Peru	4227.893	3059.514	7287.407
Uruguay		4.5	4.5
Venezuela		13787.3	13787.3
Unknown		305	305
Total	13247.78	62566.777	75814.56

Procedure for calculating internal US Federal cocaine seizure data from the FDSS and CCDB

1. The formula for calculating Internal US Federal seizures is: FDSS total* minus FDSS at-sea total minus CCDB Arrival Zone total equals Internal US Federal Total.

*Note: The FDSS is a living database that is updated as seizures occur. Thus, data extracted from the FDSS for CY 2001 may yield different results depending on the date of retrieval. For this report, data was retrieved on 12 Feb 2002.

   a. The FDSS total is calculated by summing the amount column for all events for the given year.
   b. The FDSS at-sea total is calculated by adding all amounts with a numeric state code (assigned to USCG Districts).
   c. The CCDB Arrival Zone total comes from the TZ database and is derived as stated above.
   d. A state-by-state comparison will be done during the calculation. If the CCDB amount for any state or territory (e.g. RQ) exceeds the amount in the FDSS for that same state or territory, the category result will be a negative number. In any of these cases, the negative numbers will be added back to the final number to avoid understating the internal seizures. (e.g., In 2001, the FDSS total for VQ was 0 kgs and the CCDB total was 779 kgs, resulting in 779 kgs added back to the total).

Table 1- 21 Internal Federal Seizure Totals (metric tons), CY2001

109 MT in FDSS (a/o 12 Feb 2002)
-60 MT at sea seizures
49 MT not at sea seizures
-34 MT Arrival Zone Seizures (CCDB)
+1 MT VQ seizures not counted in FDSS (see 1d above)
16 MT Internal Federal seizures

*FDSS total for this calculation counts only the events for which a Federal Drug Identification Number (FDIN) number was assigned (over 500 grams). Non-FDIN assigned seizures in the FDSS are numerous, but amount to only a small quantity of cocaine. For example, in CY 2001, there were about twice as many Non-FDIN entries than FDIN entries but their total weight was only about 2-3 percent the weight of FDIN entries.

Table 1- 22 FDSS Cocaine Seizure Totals (kilograms) by State or Coast Guard District, CY2001

State/District	Kilograms						
District 7	7585	FL	7747	MO	1077	PR	5113
District 11	50135	GA	787	MS	74	RI	3
District 13	2408	HI	28	NB	423	SC	85
AK	22	ID	1	NC	136	TN	443
AL	353	IL	914	NH	0	TX	14890
AR	7	IN	51	NJ	1055	UT	17
AZ	3327	KS	299	NM	369	VA	61
CA	6011	KY	52	NV	8	VT	2
CO	58	LA	541	NY	3035	WA	162
CT	10	MA	92	OH	293	WI	63
DC	12	MD	377	OK	29	WV	1
DE	14	MI	223	OR	46	WY	8
		MN	21	PA	117		
Grand Total	**108585**						

Table 1- 23 Worldwide* Cocaine Seizure Totals (kilograms), CY2001

Source Zone Total		**75815**
Caribbean	20460	
Mexico	11222	
MX/CA High Seas	61856	
Central America	17055	
Transit Zone Total		**110593**
Transit Zone to Non-US Total		**18831**
US Arrival Zone Total		**34396**
Internal US Federal		**16000**
Non-US Arrival Zone Total		**34827**
Worldwide Total		**290462**

* No estimates are available for US state and local seizures, which probably constitute a relatively small but not insignificant amount.

Appendix 1-D: Foreign Cocaine Consumption

Cocaine Consumption Estimate for non-US Countries (1998 and 2000)

The following regional-level cocaine consumption figures for 1998 and 2000, are based on country-by-country calculations. US consumption is taken from estimates done by Abt Associates under contract with ONDCP. Non-US figures are based on estimated country-by-country prevalence and daily-use rates. The prevalence estimates are based in part on country survey reports over the period 1996-2000. Extensive national surveys have only been undertaken in approximately 30 countries, mostly in Latin America. Where official estimates are not available, prevalence rates are estimated using anecdotal information correlating prevalence data from a similar country. Average use data for Latin America and other developing markets (including Asia and Africa) is based on detailed national surveys in Peru, Bolivia, and Mexico. Average use data for Europe was determined mostly from detailed reporting provided in the Spanish national surveys. Point estimates and ranges outside the United States (plus or minus twenty percent to indicate relative uncertainties) are provided. For this study, the amount of cocaine that could be processed from coca leaf consumed in Latin America (37 metric tons in both 1998 and 2000) is included.

Table 1- 24 Regional Cocaine Consumption, in metric tons (includes leaf)

Region	**1998**	**2000**
Latin America	159 (127-191)	183 (146-220)
US	267	259
Canada	16 (13-19)	17 (14-20)
Western Europe	97 (78-116)	116 (93-139)
Eastern Europe	10 (8-12)	13 (10-16_
Mideast, Africa, Asia	29 (23-35)	36 (29-43)
WORLD total	*578 (516-640)*	*624 (551-697)*

Methodology

To determine total cocaine consumption (including equivalent coca use), each country's cocaine consumption during any given year equals the sum of its consumption of cocaine HCl, cocaine base/crack, and leaf (in HCl equivalents). For each country (a), cocaine consumption (C_a) is the sum of HCl, base/crack, and leaf (in HCl equivalents). This can be written as:

$$C_a = T_{Ca} + T_{Ba} + T_{La} \qquad (1)$$

Where:
- T_{Ca} = total HCl consumption
- T_{Ba} = total base/crack consumption
- T_{La} = total leaf consumption (measured in metric tons of cocaine equivalence)

For our purposes, cocaine HCl consumption is assumed to be the sum of the consumption from three types of users: hardcore, moderate, and recreational. Cocaine base/crack consumption is the sum of consumption from those three user types also. (Note: National cocaine base prevalence estimates have

been published for most of the larger Latin American countries-notably for Peru, Bolivia, Colombia, Chile, and Argentina. Crack use has not been well documented, but national data are published for a number of European countries-notably the UK and Spain. As a result, most crack estimates have been assumed based mostly on anecdotal reporting.) Leaf consumption is based on country studies carried out in each particular country.

- Hardcore cocaine consumption is based on a fraction of past month cocaine users, multiplied by the adult population, multiplied by a hardcore user's annual consumption figure.

- Moderate cocaine consumption is based on the remaining fraction of past month cocaine users (those who are not hardcore), multiplied by population, multiplied by a moderate user's annual consumption figure.

- Recreational cocaine consumption is based on the difference between the number of past year users and the number of past month cocaine users, multiplied by population, multiplied by a recreational user's annual consumption figure.

The total HCl consumption in country a (T_{Ca}) is the sum of that consumed by heavy, moderate, and recreational users in that country, such that:

$$T_{Ca} = t_{CHa} + t_{CMa} + t_{CRa} \qquad (2)$$

Where:
t_{CHa} = HCl consumption by hardcore users in country a
t_{CMa} = HCl consumption by moderate users in country a
t_{CRa} = HCl consumption by recreational users in country a

Similarly for base/crack users, the total base/crack consumption (T_{Ba}) is

$$T_{Ba} = t_{BHa} + t_{BMa} + t_{BRa} \qquad (3)$$

Where:
t_{BHa} = base/crack use by hardcore users in that country
t_{BMa} = base/crack use by moderate users in that country
t_{BRa} = base/crack use by recreational users in that country

Leaf users are not subdivided by user type in this work.

The amount of cocaine HCl consumption by a hardcore user in each country (t_{CHa}) is calculated by multiplying: 1) the adult population of that country, 2) the prevalence of cocaine use among the adult population in the past month, 3) the fraction of past month users which are hardcore users, and 4) the annual HCl dosage of a hardcore user,

$$t_{CHa} = P_a \times u_{CMa} \times f_{Ca} \times c_{CHa} \qquad (4)$$

Where:
P_a = adult population (15 to 64) of country a
u_{CMa} = prevalence of cocaine HCl use in the past month
f_{Ca} = fraction of past month cocaine users which are hardcore users
c_{CHa} = the annual HCl dosage of a hardcore user

It is assumed that the number of past month users consists of hardcore and moderate users, and so the fraction of moderate users s calculated as $(1 - f_{Ca})$. The equation for the consumption by moderate users can therefore be written as:

$$t_{CMa} = P^a \times u_{CMa} \times (1 - f_{Ca}) \times c_{CMa} \quad (5)$$

Where:
- P_a = adult population (15 to 64) in country a
- u_{CMa} = prevalence of cocaine users in the past month
- f_{Ca} = fraction of past month cocaine users which are hardcore users
- c_{CMa} = the annual HCl dosage of a moderate user

The number of recreational users is assumed to be the difference between the past year prevalence and the past month prevalence. The equation for the consumption by recreational users can therefore be written as:

$$t_{CRa} = P_a \times (u_{CYa} - u_{CMa}) \times c_{CRa} \quad (6)$$

Where:
- P_a = adult population (15 to 64) in country a
- u_{CYa} = prevalence of cocaine users in the past year
- u_{CMa} = prevalence of cocaine users in the past month
- c_{CRa} = the annual HCl dosage of a recreational user

Similar equations can be written for base/crack consumption, such that:

$$t_{BHa} = P_a \times u_{BMa} \times f_{Ba} \times c_{BHa} \quad (7)$$
$$t_{BMa} = P_a \times u_{BMa} \times (1 - f_{Ba}) \times c_{BMa} \quad (8)$$
$$t_{BRa} = P_a \times (u_{BYa} - u_{BMa}) \times c_{BRa} \quad (9)$$

Where:
- P_a = adult population (15 to 64) in country a
- u_{BMa} = prevalence of base/crack users in the past month
- u_{BYa} = prevalence of cocaine users in the past year
- f_{Ba} = fraction of past month base/crack users which are hardcore users
- c_{BHa} = the annual base/crack dosage of a hardcore user
- c_{BMa} = the annual base/crack dosage of a moderate user
- c_{BRa} = annual base/crack dosage of a recreational user

User consumption figures

Estimates for cocaine HCl

Based on cocaine use patterns in Peru, Bolivia, and Mexico, we estimate that HCl consumption estimates for each user in Latin America were estimated at 0.5 grams a day for the hardcore users, 0.5 grams a week for the moderate users, and 1 gram a quarter for the recreational user. This same estimate was also applied to users in Eastern Europe, the Mideast, Africa, and Asia.

Consumption of HCl in the US and Canada is estimated to be 0.750 grams a day for the hardcore user, 0.750 grams a week for moderate users, and 1.5 grams a quarter for recreations users.

Based on Spanish use-rates and other anecdotal information, HCl consumption estimates for each user in Western Europe are estimated to be the average of the US/Canada figure and the Latin American figure. That is 0.625 grams per day for hardcore users, 0.625 grams a week for moderate users, and 1.25 gram a quarter for recreational users.

Estimates for cocaine base/crack

Based on national surveys in Peru, Bolivia, and Mexico, we estimate that base/crack users in Latin America, Eastern Europe, the Mideast, Africa, and Asia consume 0.750 grams a day for the hardcore user, 0.750 grams a week for moderate users, and 1.5 grams a quarter for recreations users.

Cocaine base/crack consumption in the US and Canada is estimated to be 1.0 grams a day for the hardcore user, 1.0 grams a week for moderate users, and 2.25 grams a quarter for recreational users.

The annual base/crack consumption estimates for each user in the Western Europe are estimated to be the average of the Latin and US use levels.

- Comparison of US and Latin American cocaine use estimates indicate that US/Canadian HCl and cocaine base/crack users consume substantially more than do their Latin American counterparts. In this analysis, it is assumed that on average some 50 percent more cocaine than do their counterparts in Latin America and about 20 percent more than their counterparts in Europe. Two of the reasons these empirical observations could be true are because of generally higher disposable incomes and the fact that the average US cocaine consumer has have been using cocaine longer than the average user elsewhere, and consequently may have developed a somewhat higher tolerance for its use. The West European market generally uses more cocaine than Latin America or the rest of the world in part because of the greater disposable income. We assess that cocaine daily cocaine use in West Europe is lower than in the US in large part because the average period of cocaine use per addict is lower in Europe mostly because Europe is a much newer market.

These figures are summarized as annualized estimates in Table 1-25 below.

Table 1- 25 Annual consumption figures for various users types, in grams per year

Drug	**Region**	**Type of User**		
		Hardcore	**Moderate**	**Recreational**
Cocaine HCl	**U.S. & Canada**	274	39	6
	Western Europe	228	32.5	5
	Rest of world	182.5	26	4
Base/crack	U.S. & Canada	365	52	9
	Western Europe	319	45.5	7.5
	Rest of world	274	39	6

Fraction of past month users which are hardcore users

National survey data from Peru and Mexico indicated that approximately 20 percent of all past month cocaine HCl consumers consumed the drug three or more times a week—or more than 10 times per month. We categorized these consumers hardcore, and note from the same data that these Latin American cocaine HCl users consume on average a little more than one pure gram of cocaine each day at least four days a week—or at least 0.5 grams of HCl each day on average.

- The same monthly data indicate that non-hardcore past month cocaine HCl consumers used on average about two grams a month, or about 0.5 grams each week Almost 20 percent of those that had consumed cocaine HCl in the past month did so only one time.

National survey data from Peru and Mexico indicated that about 30 percent of all past month cocaine base users consumed cocaine base three or more times a week—or more than 10 times a month. From the same national surveys, we note that cocaine base users on average consumed almost 1.5 grams of pure cocaine base/crack each day for about 4 days a week—or about 0.75 gram of cocaine base each week.

- The same monthly data indicate that non-hardcore past month cocaine base/crack consumers used on average about three grams a month, or about 0.75 grams each week Only around 10 percent of those that had consumed cocaine base/crack in the past month did so only one time.

Abt associates has tracked what they call chronic cocaine consumers since 1988. They define chronic use as more than 10 times a month—the same definition that is referred to here (and elsewhere) as hardcore use. Abt data indicates that overall chronic cocaine use (for both cocaine HCL and crack) has increased from less than forty percent of total use to almost fifty percent of total in 2000. As a conservative estimate, we assume that 30 percent of all past-month US and Canadian cocaine HCl consumers are chronic are hardcore users and that 40 percent of all past-month crack cocaine users are hardcore.

Again, we assume that the relative shares of hardcore and moderate users in Western Europe can be estimated by averaging those in US and the rest of the world. These fractions are shown in table 1-26:

Table 1- 26 Fraction of past month cocaine users which are hardcore users

Drug	**Region**	**Fraction of past month HCl users (f)**
Cocaine HCl	U.S. & Canada	30%
	Western Europe	25%
	Rest of world	20%
Base/crack	U.S. & Canada	40%
	Western Europe	35%
	Rest of world	30%

Comparisons with overall use rates

This model disaggregates cocaine users into three distinct groups, hardcore, moderate, and recreational. Summing the three groups, indicates that "on average" every cocaine user in Latin America during the year 2000 used almost exactly 100 milligrams of cocaine HCl or base each day. In the US, the model indicates that "on average" all cocaine consumers used almost 180 milligrams per day, while in West Europe it indicates that "on average" each consumer used about 120 milligrams a day.

Table 1- 27 Largest cocaine consuming countries, 2000, including coca leaf in cocaine equivalence

	Adult Population (Millions, ages 15 to 64)	Total HCl Consumption, metric tons	Total Base/crack Consumption, metric tons	Total Cocaine Consumption, metric tons	Coca leaf, HCl equivalence	Consumption Cocaine and HCl equivalence
United States	182.17	180.42	78.66	259.08		259.08
Brazil	113.39	27.65	19.64	47.30		47.30
United Kingdom	38.85	19.62	6.13	25.75		25.75
Peru	16.35	3.49	6.62	10.11	15.00	25.11
Bolivia	4.60	1.96	3.22	5.17	17.00	22.17
Colombia	25.06	6.14	14.17	20.32	1.00	21.32
Germany	56.33	15.81	4.61	20.42		20.42
Spain	27.32	15.68	4.06	19.74		19.74
Canada	21.31	12.30	4.16	16.46		16.46
Italy	39.01	12.64	3.19	15.83		15.83
Argentina	23.24	6.07	4.17	10.24	4.00	14.24
Mexico	62.09	8.28	5.38	13.66		13.66
France	38.67	8.35	2.88	11.23		11.23
Venezuela	14.76	2.71	5.12	7.83		7.83
Chile	9.88	3.58	3.79	7.37		7.37
Australia	12.78	3.83	2.58	6.42		6.42
Russia	101.12	3.20	2.86	6.06		6.06
South Africa	27.25	3.45	2.36	5.81		5.81
Nigeria	65.83	4.39	1.01	5.40		5.40
Ecuador	7.68	1.65	3.55	5.19		5.19
Netherlands	10.80	2.67	2.05	4.72		4.72
Guatemala	6.83	1.73	2.37	4.09		4.09
Dominican Republic	5.13	2.01	2.07	4.08		4.08
Portugal	6.79	2.05	1.01	3.06		3.06

Note: Table 1-27 lists the largest consuming countries, however eight of those countries, including Brazil, have estimated use amounts based on various fragments of information. The other 16 countries have country surveys which document the cocaine use.

Example calculation

To calculate the cocaine consumption of the United Kingdom, begin by gathering the relevant data from table 1-24 and table 1-25, as follows**:**

P (population from appendix)	= 38.85 M
U_{CY} (past year use of HCl, from appendix)	= 1.7%
u_{BY} (past year use of base/crack, from appendix)	= 0.32%
u_{CM} (past month use of HCl, from appendix)	= 0.55%
u_{BM} (past month use of base/crack, from appendix)	= 0.1%
c_{CH} (annual HCl dosage of a hardcore user in W Eur, table 1)	= 228 gm/yr
c_{CM} (annual HCl dosage of a moderate user in W Eur, table 1)	= 32.5 gm/yr
c_{CR} (annual HCl dosage of a recreational user in W Eur, table 1)	= 5 gm/yr
c_{BH} (annual base/crack dosage of a hardcore user in W Eur, table 1)	= 319 gm/yr
c_{BM} (annual base/crack dosage of a moderate user in W Eur, table 1)	= 45.5 gm/yr
c_{BR} (annual base/crack dosage of a recreational user in W Eur, table 1)	= 7.5 gm/yr
f_C (fraction of past month HCl users which are hardcore users, table 2)	= 25%
f_B (fraction of past month base/crack users which are hardcore, table 2)	= 35%

Equations 4-9 can be used to calculate the amount of HCl and base/crack consumed by each of the user types, as follows:

$$t_{CH} = P \times u_{CM} \times f_C \times c_{CH} \quad (4)$$
$$= 38.85M \times 0.55\% \times 25\% \times 228gm/yr$$
$$= 12.2 \text{ mt}$$

$$t_{CM} = P \times u_{CM} \times (1 - f_C) \times c_{CM} \quad (5)$$
$$= 38.85M \times 0.55\% \times (1-25\%) \times 32.5gm/yr$$
$$= 5.2 \text{ mt}$$

$$t_{CR} = P \times (u_{CY} - u_{CM}) \times c_{CR} \quad (6)$$
$$= 38.85M \times (1.70\% - 0.55\%) \times 5 \text{ gm/yr}$$
$$= 2.2 \text{ mt}$$

$$t_{BH} = P \times u_{BM} \times f_B \times c_{BH} \quad (7)$$
$$= 38.85M \times 0.10\% \times 35\% \times 319gm/yr$$
$$= 4.3 \text{ mt}$$

$$t_{BM} = P \times u_{BM} \times (1 - f_B) \times c_{BM} \quad (8)$$
$$= 38.85M \times 0.10\% \times (1-35\%) \times 45.5gm/yr$$
$$= 1.15 \text{ mt}$$

$$t_{BR} = P \times (u_{BY} - u_{BM}) \times c_{BR} \quad (9)$$
$$= 38.85M \times (0.32\% - 0.10\%) \times 7.5 \text{ gm/yr}$$
$$= 0.65 \text{ mt}$$

Equations 2 and 3 can be used to calculate the amount of HCl and base/crack consumed, respectively:

$$T_C = t_{CH} + t_{CM} + t_{CR} \quad (2)$$
$$= 12.2 + 5.2 + 2.2$$
$$= 19.6 \text{ mt}$$

$$T_B = t_{BH} + t_{BM} + t_{BR} \quad (3)$$
$$= 4.3 + 1.15 + 0.65$$
$$= 6.1 \text{ mt}$$

Equation 1 can be used to calculate the total cocaine consumed in the United Kingdom, as:

$$C = T_C + T_B + T_L \quad (1)$$
$$= 19.6 + 6.1 + 0 \text{ (no leaf consumption)}$$
$$= 25.7 \text{ mt}$$

Country Estimates

For each country, the appendix provides official population estimates from the US Census International Department. Estimates of the prevalence of past year users of HCl (U_{CY}), the prevalence of past year users of base/crack (U_{BY}), the prevalence of past month users of HCl (U_{CM}), and the prevalence of past month users of base/crack (U_{BM}) were described in the body of this appendix. Note, while prevalence estimates for most of the larger cocaine base/crack-using and cocaine HCl-using countries are based on official estimates, the majority of the smaller countries have not done surveys and in many cases do not have national estimates or estimates made by the UNDCP.

Where:

- P = population of adults (age 15-64) in millions in 2000
- u_{CY} = prevalence of HCl users in the past year
- u_{BY} = prevalence of base/crack users in the past year
- u_{CM} = prevalence of HCl users in the past month
- u_{BM} = prevalence of base/crack users in the past month

Table 1- 28 Country Population and Prevalence Estimates for 2000

Country	Population	U_{CY}	U_{BY}	U_{CM}	U_{BM}
Afghanistan	14.20	0.010%	0.002%	0.003%	0.001%
Albania	2.20	0.100%	0.020%	0.050%	0.010%
Algeria	18.96	0.040%	0.010%	0.010%	0.005%
Andorra	0.05	0.200%	0.050%	0.050%	0.015%
Angola	5.49	0.040%	0.010%	0.010%	0.005%
Anguilla	0.01	0.200%	0.200%	0.100%	0.100%
Antigua and Barbuda	0.04	0.200%	0.200%	0.100%	0.100%
Argentina	23.24	1.200%	0.400%	0.400%	0.150%
Armenia	2.22	0.030%	0.010%	0.015%	0.005%
Auba	0.05	0.200%	0.200%	0.100%	0.100%

Australia	12.78	1.500%	0.350%	0.450%	0.175%
Austria	5.52	0.600%	0.100%	0.300%	0.050%
Azerbaijan	4.92	0.030%	0.010%	0.015%	0.005%
Bahrain	0.43	0.040%	0.010%	0.010%	0.005%
Bangladesh	77.92	0.010%	0.002%	0.003%	0.001%
Barbados	0.19	0.100%	0.100%	0.050%	0.050%
Belarus	7.03	0.125%	0.040%	0.050%	0.025%
Belgium	6.72	0.600%	0.100%	0.300%	0.050%
Belize	0.13	0.400%	0.300%	0.200%	0.150%
Benin	3.11	0.100%	0.020%	0.050%	0.005%
Bhutan	1.12	0.010%	0.002%	0.003%	0.001%
Bolivia	4.60	1.300%	1.300%	0.700%	0.600%
Bosnia and Herzegovina	2.73	0.100%	0.020%	0.050%	0.010%
Botswana	0.87	0.100%	0.010%	0.030%	0.005%
Brazil	113.39	1.100%	0.300%	0.375%	0.150%
British Virgin Islands	0.01	0.100%	0.100%	0.050%	0.050%
Brunei	0.22	0.010%	0.002%	0.003%	0.001%
Bukina Faso	5.91	0.040%	0.010%	0.010%	0.005%
Bulgaria	5.30	0.100%	0.020%	0.050%	0.010%
Burundi	3.13	0.040%	0.010%	0.010%	0.005%
Cambodia	6.68	0.010%	0.002%	0.003%	0.001%
Cameroon	8.34	0.100%	0.020%	0.050%	0.005%
Canada	21.31	1.000%	0.300%	0.500%	0.100%
Cape Verde	0.20	0.040%	0.010%	0.010%	0.005%
Cayman Islands	0.02	0.100%	0.100%	0.050%	0.050%
Centrla African Republic	1.86	0.040%	0.010%	0.010%	0.005%
Chad	4.17	0.010%	0.005%	0.005%	0.001%
Chile	9.88	1.460%	0.700%	0.570%	0.330%
China	853.19	0.010%	0.002%	0.003%	0.001%
China (Hong Kong SAR)	5.08	0.150%	0.060%	0.060%	0.030%
Colombia	25.06	0.800%	0.800%	0.400%	0.500%
Comoros	0.31	0.040%	0.010%	0.010%	0.005%
Congo, Democratic Rep.	25.54	0.010%	0.005%	0.005%	0.001%
Congo, the Republic	1.53	0.010%	0.005%	0.005%	0.001%
Cook Islands	0.01	0.010%	0.002%	0.003%	0.001%
Costa Rica	2.33	0.400%	0.250%	0.200%	0.125%
Cote d'Ivoire	8.21	0.100%	0.010%	0.030%	0.005%
Croatia	2.87	0.130%	0.030%	0.065%	0.015%
Cuba	7.68	0.100%	0.100%	0.050%	0.050%
Cyprus	0.50	0.100%	0.020%	0.050%	0.010%
Czech Republic	7.16	0.050%	0.010%	0.025%	0.005%
Denmark	3.56	1.000%	0.100%	0.500%	0.050%
Djibouti	0.25	0.040%	0.010%	0.010%	0.005%
Dominica	0.05	0.100%	0.100%	0.050%	0.050%
Dominican Republic	5.13	1.800%	0.700%	0.600%	0.350%
Ecuador	7.68	0.700%	0.800%	0.350%	0.400%
Egypt	41.83	0.040%	0.010%	0.010%	0.005%
El Salvador	3.49	0.500%	0.300%	0.200%	0.150%

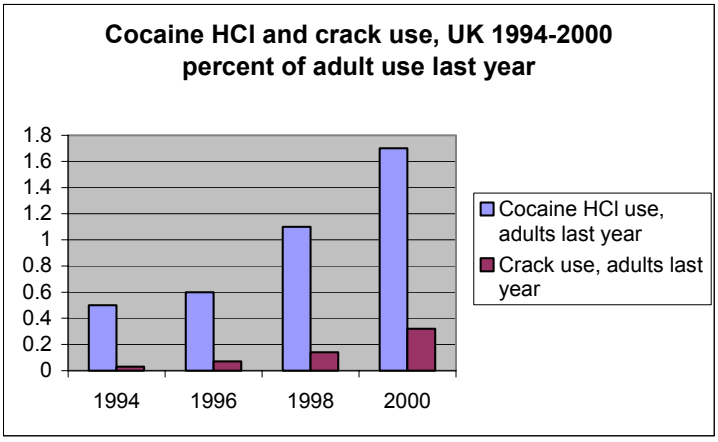
Equatorial Guinea	0.25	0.040%	0.010%	0.010%	0.005%
Eritea	2.23	0.040%	0.010%	0.010%	0.005%
Estonia	0.97	0.035%	0.015%	0.018%	0.010%
Ethiopoia	32.18	0.040%	0.010%	0.010%	0.005%
Fiji	0.53	0.010%	0.002%	0.003%	0.001%
Finland	3.46	0.300%	0.020%	0.150%	0.010%
France	38.67	0.500%	0.100%	0.250%	0.050%
French Guiana	0.11	0.300%	0.300%	0.150%	0.150%
Gabon	0.74	0.100%	0.010%	0.030%	0.005%
Gambia	0.71	0.040%	0.010%	0.010%	0.005%
Gaza Strip	0.54	0.030%	0.010%	0.015%	0.005%
Georgia	3.39	0.125%	0.040%	0.050%	0.025%
Germany	56.33	0.650%	0.110%	0.325%	0.055%
Ghana	10.68	1.100%	0.040%	0.060%	0.010%
Greece	7.16	0.600%	0.100%	0.250%	0.050%
Greenland	0.04	0.200%	0.020%	0.100%	0.010%
Grenada	0.05	0.200%	0.200%	0.100%	0.100%
Guadeloupe	0.28	0.400%	0.300%	0.200%	0.150%
Guatemala	6.83	1.000%	0.600%	0.400%	0.300%
Guinea	4.03	0.040%	0.010%	0.010%	0.005%
Guinea-Bissau	0.71	0.040%	0.010%	0.010%	0.005%
Guyana	0.46	0.300%	0.300%	0.150%	0.150%
Haiti	3.76	0.150%	0.150%	0.050%	0.075%
Honduras	3.37	1.000%	1.000%	0.400%	0.400%
Hungary	6.94	0.100%	0.020%	0.050%	0.010%
Iceland	0.18	0.200%	0.020%	0.100%	0.010%
India	626.52	0.010%	0.002%	0.003%	0.001%
Indonesia	146.01	0.010%	0.002%	0.003%	0.001%
Iran	40.03	0.030%	0.010%	0.015%	0.005%
Iraq	12.40	0.030%	0.010%	0.015%	0.005%
Ireland	2.54	2.000%	0.200%	1.000%	0.100%
Israel	3.65	0.700%	0.350%	0.350%	0.225%
Italy	39.01	0.750%	0.110%	0.375%	0.055%
Jamaica	1.67	0.500%	0.500%	0.250%	0.250%
Japan	86.34	0.050%	0.025%	0.020%	0.010%
Jordan	2.94	0.030%	0.010%	0.015%	0.005%
Kazakstan	10.96	0.030%	0.010%	0.015%	0.005%
Kenya	16.52	0.100%	0.010%	0.030%	0.005%
Kiribati	0.05	0.010%	0.002%	0.003%	0.001%
Korea, North	14.73	0.010%	0.002%	0.003%	0.001%
Korea, South	33.82	0.010%	0.002%	0.003%	0.001%
Kuwait	1.35	0.030%	0.010%	0.015%	0.005%
Kyrgyzstan	2.73	0.030%	0.010%	0.015%	0.005%
Laos	2.95	0.010%	0.002%	0.003%	0.001%
Latvia	1.63	0.030%	0.010%	0.015%	0.005%
Lebanon	2.34	0.100%	0.050%	0.030%	0.010%
Lesotho	1.20	0.100%	0.010%	0.030%	0.005%
Liberia	1.69	0.100%	0.010%	0.030%	0.005%

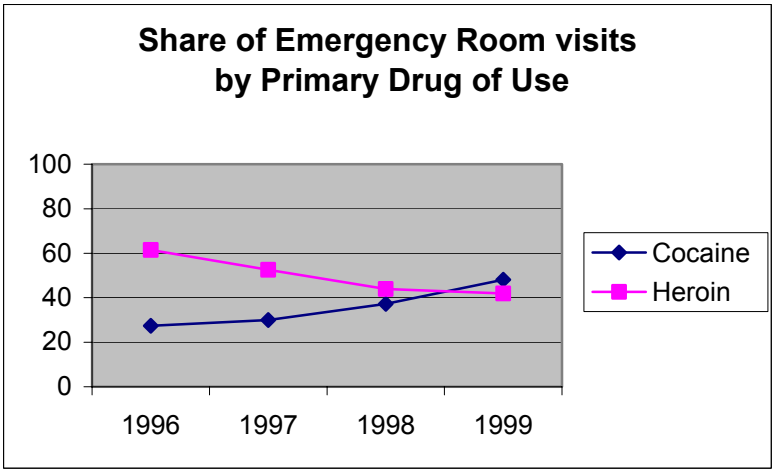
Libya	3.08	0.040%	0.010%	0.010%	0.005%
Liechtenstein	0.02	0.200%	0.050%	0.050%	0.015%
Lithuania	2.44	0.035%	0.015%	0.018%	0.010%
Luxembourg	0.29	0.400%	0.050%	0.200%	0.015%
Macau	0.31	0.010%	0.002%	0.003%	0.001%
Macedonia	1.36	0.030%	0.010%	0.015%	0.005%
Madagascar	8.02	0.040%	0.010%	0.010%	0.005%
Malawi	5.44	0.040%	0.010%	0.010%	0.005%
Malaysia	13.30	0.010%	0.002%	0.003%	0.001%
Maldives	0.15	0.010%	0.002%	0.003%	0.001%
Mali	5.31	0.040%	0.010%	0.010%	0.005%
Malta	0.26	0.100%	0.020%	0.050%	0.010%
Marshall Island	0.03	0.010%	0.002%	0.003%	0.001%
Martinique	0.28	0.400%	0.300%	0.200%	0.150%
Mauritania	1.37	0.040%	0.010%	0.010%	0.005%
Mauritius	0.80	0.040%	0.010%	0.010%	0.005%
Mexico	62.09	0.470%	0.150%	0.215%	0.075%
Micronesia	0.06	0.010%	0.002%	0.003%	0.001%
Moldova	2.97	0.030%	0.010%	0.015%	0.005%
Monaco	0.02	0.100%	0.020%	0.050%	0.010%
Mongolia	1.63	0.010%	0.002%	0.003%	0.001%
Montenegro	0.45	0.100%	0.020%	0.050%	0.010%
Montserrat	0.00	0.100%	0.100%	0.050%	0.050%
Morocco	18.19	0.040%	0.010%	0.010%	0.005%
Mozambique	10.39	0.040%	0.010%	0.010%	0.005%
Myanmar (Burma)	27.33	0.010%	0.002%	0.003%	0.001%
Namibia	0.94	0.200%	0.050%	0.100%	0.003%
Nauru	0.01	0.010%	0.002%	0.003%	0.001%
Nepal	13.80	0.010%	0.002%	0.003%	0.001%
Netherlands	10.80	0.750%	0.300%	0.275%	0.125%
Netherlands Antilles	0.14	0.200%	0.200%	0.100%	0.100%
New Caldonia	0.13	0.010%	0.002%	0.003%	0.001%
New Zealand	2.52	0.050%	0.010%	0.017%	0.005%
Nicaragua	2.77	0.400%	0.300%	0.200%	0.150%
Niger	5.01	0.040%	0.010%	0.010%	0.005%
Nigeria	65.83	1.000%	0.040%	0.050%	0.013%
Norway	2.90	0.300%	0.050%	0.150%	0.020%
Oman	1.43	0.040%	0.010%	0.010%	0.005%
Pakistan	77.73	0.010%	0.002%	0.003%	0.001%
Panama	1.78	1.100%	0.600%	0.500%	0.350%
Papua New Guinea	2.84	0.010%	0.002%	0.003%	0.001%
Paraguay	3.14	0.400%	0.300%	0.200%	0.150%
Peru	16.35	0.900%	0.900%	0.600%	0.600%
Philippines	48.06	0.030%	0.020%	0.010%	0.005%
Poland	26.56	0.125%	0.040%	0.050%	0.025%
Portugal	6.79	0.700%	0.200%	0.350%	0.100%
Qatar	0.53	0.040%	0.010%	0.010%	0.005%
Romania	15.31	0.030%	0.010%	0.015%	0.005%

Russia	101.12	0.125%	0.040%	0.050%	0.025%
Rwanda	3.91	0.040%	0.010%	0.010%	0.005%
Saint Kitts and Nevis	0.02	0.200%	0.200%	0.100%	0.100%
Saint Lucia	0.10	0.200%	0.200%	0.100%	0.100%
Saint Vincent and the Grenadines	0.07	0.100%	0.100%	0.050%	0.050%
Samoa	0.11	0.010%	0.002%	0.003%	0.001%
San Marino	0.02	0.100%	0.020%	0.050%	0.010%
Sao Tome and Principe	0.08	0.020%	0.010%	0.010%	0.005%
Saudi Arabia	12.06	0.040%	0.010%	0.010%	0.005%
Senegal	5.23	0.020%	0.010%	0.010%	0.005%
Serbia	6.51	0.100%	0.020%	0.050%	0.010%
Seychelles	0.05	0.040%	0.010%	0.010%	0.005%
Sierra Leone	2.73	0.020%	0.010%	0.010%	0.005%
Singapore	3.11	0.010%	0.002%	0.003%	0.001%
Slovenia	1.34	0.100%	0.020%	0.050%	0.010%
Solomon Islands	0.25	0.010%	0.002%	0.003%	0.001%
Solvakia	3.74	0.100%	0.020%	0.050%	0.010%
Somalia	3.83	0.040%	0.010%	0.010%	0.005%
South Africa	27.25	0.500%	0.150%	0.200%	0.075%
Spain	27.32	1.550%	0.200%	0.650%	0.100%
Sri Lanka	12.89	0.010%	0.002%	0.003%	0.001%
Sudan	18.59	0.040%	0.010%	0.010%	0.005%
Suriname	0.27	0.300%	0.300%	0.150%	0.150%
Swaziland	0.56	0.200%	0.050%	0.030%	0.020%
Sweden	5.71	0.200%	0.020%	0.100%	0.010%
Switzerland	4.92	0.500%	0.100%	0.250%	0.030%
Syria	9.16	0.030%	0.010%	0.015%	0.005%
Taiwan	15.50	0.030%	0.020%	0.010%	0.005%
Tajikistan	3.45	0.030%	0.010%	0.015%	0.005%
Tanzania	18.44	0.100%	0.020%	0.030%	0.005%
Thailand	42.82	0.020%	0.010%	0.005%	0.005%
The Bahamas	0.19	0.300%	0.300%	0.150%	0.150%
Togo	2.58	1.100%	0.100%	0.200%	0.050%
Tonga	0.06	0.010%	0.002%	0.003%	0.001%
Trinidad and Tobago	0.80	0.100%	0.100%	0.050%	0.050%
Tunisia	6.17	0.040%	0.010%	0.010%	0.005%
Turkey	42.64	0.100%	0.020%	0.030%	0.010%
Turkmenistan	2.60	0.030%	0.010%	0.015%	0.005%
Turks and Caicos Islands	0.01	0.100%	0.100%	0.050%	0.050%
Tuvalu	0.01	0.010%	0.002%	0.003%	0.001%
Uganda	10.89	0.040%	0.010%	0.010%	0.005%
Ukraine	33.53	0.125%	0.040%	0.050%	0.025%
United Arab Emirates	1.61	0.030%	0.010%	0.015%	0.005%
United Kingdom	38.85	1.700%	0.320%	0.550%	0.100%
United States	182.17	1.690%	0.364%	0.700%	0.200%
Uruguay	2.09	0.400%	0.300%	0.200%	0.150%

Uzbekistan	14.42	0.030%	0.010%	0.015%	0.005%
Vanuatu	0.11	0.010%	0.002%	0.003%	0.001%
Venezuela	14.76	0.600%	0.600%	0.300%	0.300%
Viet Nam	48.64	0.010%	0.002%	0.003%	0.001%
West Bank	1.04	0.030%	0.010%	0.015%	0.005%
Western Sahara	0.12	0.040%	0.010%	0.010%	0.005%
Yemen	8.64	0.030%	0.010%	0.015%	0.005%
Zambia	4.78	0.040%	0.010%	0.010%	0.005%
Zimbabwe	6.45	0.040%	0.010%	0.010%	0.005%

Figure 1-4 - Indications of Increasing Cocaine Consumption in Europe





Sources of prevalence information

Prevalence information for this study came principally from three separate sources: national surveys, European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) reporting, and UNDCP reporting.

National surveys

These are by far the most valuable, but unfortunately the least available on a comprehensive basis. The following have been consulted for this study:

- **United States**: The Department of Health and Human Services (most recently via its SAMHSA program) has been publishing annual household surveys on drug use since 1979. That data has the disadvantage of not covering non-household populations, but provides a consistent set of data that allows trend analysis. The most recently reported US survey was done in 2000, and published in August of 2001.

- **United Kingdom:** Since 1994, the Home Office has been publishing its British Crime Survey (BCS) every two years. It's latest publication is "Home Office Research Study 224, Drug misuse declared in 2000: results from the British Crime Survey," published in September, 2001.

- **Spain**: Spain's Interior Ministry has been publishing its biannual household survey on drug use since 1995. Its latest survey was carried out in 1999 and published as Informe #4, "Observatorio Espanol Sobre Drogas," in March 2001. The Department of Interior's Delegacion del Gobierno para el Plan Nacional de Drogas also supports substantial research including a recent 49 page monograph on cocaine, entitled, "Monografia Cocaine," in Adicciones, Vol. 13, suplemento 2, 2001; that monograph details recent trends, as well as describes in depth Spain's growing cocaine problem.

- **Chile**: Chile has perhaps Latin America's premier drug survey organization. The Interior Ministry's National Council for Drug Control (CONACE) has published extensive biannual surveys since 1994. The most recent survey is "The Fourth National Study on Drug Consumption in Chile." The research was done during September through December of 2000, and published in May of 2001. All four national surveys on Chile were consulted for this study.

- **Peru**: Peru has done three national drug surveys, in 1998, 1995, and 1997. These studies were done by CEDRO, an non-governmental organization (NGO) supported in large part by the US Embassy. The proposed 1999 study was not funded in part because of a dispute over who would be in charge of the survey. NAS, however, is working with the Peruvian drug czar to reinstitute the program. The Peruvian data including very detailed reporting on past-month drug use, allowing us to estimate the share of past-month user who are addicts and how much they use.

- **Bolivia**: Bolivia has relied on CELIN, an NGO supported mostly by the US Embassy to carry out its national drug surveys every two years since 1992. The last published survey was completely in 1998 and published in 2000. The Bolivia NGO has also done substantial research on coca leaf use, publishing a full survey and book analysis in 1997.

- **Argentina**: The Office of the President's National Drug Control Secretariat carried out an national survey in March of 1999. That survey was published in June of 1999, and indicated that drug use in Argentina on a per capita basis was worse than in the US.

- **Colombia**: Colombia's National Drug Control Office carried out national surveys in 1996 and 1998. The Health Ministry did a much more comprehensive national survey in 1997. Since that time, two national youth surveys have been carried out in 1999 and 2001 by Rumbos, the Office of the President's Demand Reduction Czar.

- **Mexico**: Mexico carried out extensive national drug surveys in 1988, 1993, and 1998. Its next national survey is scheduled for 2003. In addition, Mexican researchers have carried out periodic youth (school) surveys and has an active epidemiological reporting program monitoring drug treatment trends throughout the country.

- **Brazil**: Brazil is just now planning it's first national drug survey with a million dollars from the US Embassy. It has done, however, youth (school) surveys every two years since the late 1980s. In addition, it has done state surveys on Sao Paulo and Florianopolis in recent years.

- **EMCDDA Reporting**: The EMCDDA carries out an aggressive drug prevalence program. Their most recent publication is it's 2001 annual report of the state of the drugs problem in the European Union. That report summarizes European prevalence data through 1999.

  The most valuable EMCDDA program is its annual country reports. The most recent such are for 2000 and were published last year. Those reports are each a hundred pages are more and summarize all drug trends by individual countries. As a special feature, for 2000, the reports all had special sections detailing cocaine trends. Consensus of virtually each one of these reports was that increased availabilities of cocaine had substantially lower prices during 1999-2000, which had resulted in large increased in cocaine use in those countries. In contrast, virtually each country reported that other drugs, notably Ecstasy and heroin had seen decline use. For 2000, country reports were available and consulted on for virtually every West European country and most East European countries.

- **United Nations**: Our final source of information of prevalence trends is the "Global Illicit Drug Trends 2001, published last year by the UNDCP. That report summarizes other information, and provides unique reporting on several African, Caribbean, and Asian-Pacific countries.

Appendix 1-E: U.S. Cocaine Consumption Estimate

Domestic cocaine consumption estimates[4] were developed through contracted Policy Research. The method for calculating cocaine consumption is to first estimate the number of occasional and chronic cocaine users, estimate their weekly expenditures to calculate total expenditures, then divide that expenditure total by an estimate of retail cocaine prices[5]. Table 1-29 below summarizes the figures used in calculation of consumption, and table 1-30 summarizes the price data.

Table 1- 29 Calculation of domestic cocaine consumption, 1996-2000

Description	Reference	Units	Variable	1996	1997	1998	1999	2000
# Occasional users	Ref A, table 3	thousands	U1	3,425	3,487	3,216	3,216	3,035
# Chronic users	Ref A, table 3	thousands	U2	2,828	2,847	2,800	2,755	2,707
Weekly expenditure by occasional users	Ref A, text	2000 dollars	E1	$35	$35	$35	$35	$35
Weekly expenditure by chronic users	Ref A, table 4	2000 dollars	E2	$220	$188	$197	$206	$212
CPI adjustment			Y	1.10	1.07	1.06	1.03	1.00
Total Expenditures for occasional users	Ref A, table 5	2000 billion dollars	E1=U1*E1*Y*52 /1,000,000	$6.9	$6.8	$6.2	$6.0	$5.5
Total Expenditures for chronic users	Ref A, table 5	2000 billion dollars	E2=U2*E2*52 /1,000,000	$32.4	$27.9	$28.7	$29.5	$29.8
Total Expenditures for all users	Ref A, table 5	2000 billion dollars	E=E1+E2	$39.2	$34.7	$34.9	$35.6	$35.3
Retail Prices	Ref A, table 6	2000 dollars per pure g	P	$144	$140	$145	$145	$152
Barter purchases	Ref A, text	percentage	R	11%	11%	11%	11%	11%
Total consumption	Ref A, table 7	metric tons	C=E/P*1000 *(1+R)	301	275	267	272	259

[4] *What America's Users Spend on Illegal Drugs, 1988-2000*, ONDCP, December 2001, in-publication
[5] *The Price of Illicit Drugs, 1981-2000*, ONDCP, October 2001

Table 1- 30 Estimation of street-level cocaine prices

Year	Quarter	Quarterly Price ($/pure g)	Frequency	Annual Price ($/pure g)	3-yr Average Annual Price ($/pure g)
1987	1q87	$321.91	189		
1987	2q87	$291.53	203		
1987	3q87	$206.21	241		
1987	4q87	$174.50	251	$241.54	
1988	1q88	$152.33	259		
1988	2q88	$173.08	368		
1988	3q88	$162.41	386		
1988	4q88	$130.44	387	$154.51	$180
1989	1q89	$134.28	380		
1989	2q89	$139.46	539		
1989	3q89	$137.32	421		
1989	4q89	$171.93	336	$144.26	$171
1990	1q90	$194.62	466		
1990	2q90	$230.43	285		
1990	3q90	$227.42	486		
1990	4q90	$203.32	351	$213.01	$174
1991	1q91	$174.18	544		
1991	2q91	$164.20	482		
1991	3q91	$159.20	443		
1991	4q91	$153.86	371	$163.86	$178
1992	1q92	$132.54	355		
1992	2q92	$191.21	305		
1992	3q92	$155.91	317		
1992	4q92	$157.04	225	$158.18	$160
1993	1q93	$163.35	232		
1993	2q93	$175.99	230		
1993	3q93	$145.47	216		
1993	4q93	$149.37	226	$158.80	$151
1994	1q94	$139.10	199		
1994	2q94	$129.18	195		
1994	3q94	$147.43	272		
1994	4q94	$121.60	155	$136.20	$147
1995	1q95	$120.96	167		
1995	2q95	$136.73	194		
1995	3q95	$141.07	266		
1995	4q95	$185.18	205	$146.89	$139
1996	1q96	$135.58	174		
1996	2q96	$137.26	238		
1996	3q96	$142.23	209		
1996	4q96	$119.14	259	$132.78	$144
1997	1q97	$125.47	252		
1997	2q97	$192.69	274		
1997	3q97	$154.44	259		

1997	4q97	$131.80	167	$153.81	$140
1998	1q98	$119.63	196		
1998	2q98	$120.56	245		
1998	3q98	$139.74	261		
1998	4q98	$147.97	260	$132.98	$145
1999	1q99	$183.12	360		
1999	2q99	$154.39	334		
1999	3q99	$128.76	489		
1999	4q99	$135.81	371	$148.54	$145
2000	1q00	$165.64	362		
2000	2q00	$205.82	304	$154.57	$152

Chapter 2: Estimate of Heroin Availability in the United States

The Heroin Availability Working Group (WG) has concluded that US heroin consumption in 2001 was between 13 and 18 metric tons of pure heroin, based on two heroin demand studies: the Abt Associates estimate of 13 metric tons and the intelligence-based Global Heroin Threat Assessment estimate of 18 metric tons. The WG used these consumption-based estimates because we concluded that it is not possible to create a credible supply-based estimate of the amount of heroin available for US consumption without substantial additional data collection. While the WG was able to create supply-based estimates which *appeared* reasonable, the estimates were based on data sources which contradicted each other—raising questions about the estimates' reliability. Accordingly, the WG recommends the following five actions:

- **Use more easily measurable statistics than the amount of heroin available for consumption as indicators of counternarcotics success.** For example, data from the Drug Abuse Warning Network (DAWN), the National Household Survey on Drug Abuse, the Monitoring the Future (MTF) survey, the Arrestee Drug Abuse Monitoring (ADAM) program, the Parent's Resource Institute for Drug Education (PRIDE) survey, and DEA data on price and purity could be used, in combination, to judge performance effectiveness. Wherever possible, the WG believes it would be appropriate to expand the coverage of the sample data collected by these programs.

- **Create or improve estimates of the number of chronic and casual heroin users in each state or section of the country. This effort should include categorizing heroin users by method of administration (i.e., injecting, smoking, and snorting), dosage size, frequency of use, and type of heroin consumed (i.e., black tar or white powder).** Such improvements would be neither easy nor cheap, but would be essential to constructing valid consumption estimates, if such estimates are deemed useful for purposes beyond their use as performance measures. The WG believes such estimates would be useful because the USG lacks much basic information, including the numbers of users in the eastern and western US, the quantities used by powder vs. black tar users, the numbers who snort vs. inject, etc. A program for achieving these improvements should be carried out by an organization like the Substance Abuse Mental Health Services Administration (SAMSHA), rather than law enforcement or intelligence organizations. Such a program probably would require a minimum of two years and a budget on the order of SAMSHA's National Household Survey on Drug Abuse (NHSDA).

- **Agencies responsible for publishing statistics on heroin production, interdiction, and domestic availability should examine their methodologies to determine if improvements or changes are needed to resolve any inconsistencies and make the data more useful to policymakers.** At present, there is a glaring inconsistency in comparing the leading producers of US-bound heroin based on production statistics with the leading heroin source countries based on seizure and availability statistics. This inconsistency precludes creation, at this time, of any credible supply-based estimate of US heroin consumption.

- **Undertake an effort to measure the heroin laboratory processing efficiencies in important producing countries.** Opium yield studies provide a crucial first step in estimating a country's heroin production based on its opium poppy cultivation, but it is also necessary to estimate the processing efficiencies of the country's heroin labs to estimate heroin production as accurately as possible.

- **The working group recommends that enhanced staffing and resources be provided to the DEA Special Testing and Research Laboratory to pursue proven scientific methodologies—such as isotopic-ratio analysis—that will provide the means to confirm the geographical origin of heroin with an extremely high confidence rate.**

Implementation of these five recommendations would not only make it possible to derive supply-based estimates of heroin consumption, but also would improve the accuracy and coverage of the data.

Overview of the Heroin Availability Study

The Heroin Availability Working Group (WG) has concluded that heroin available for US consumption in 2001 was between 13 and 18 metric tons of pure heroin. This conclusion is based on the two best heroin consumption studies currently available: the Abt Associates[6] estimate of 13 metric tons and the Global Heroin Threat Assessment estimate of 18 metric tons.[7]

The direction given to the WG was to create an estimate of the amount of heroin available for US consumption based on information about the worldwide supply of heroin. However, we were forced to conclude that it is not currently possible with the available data. While the WG was able to create overall heroin supply estimates that *appeared* reasonable in the aggregate, the estimates were based on data sources which contradicted each other for particular source countries. Given the conflict between the various heroin supply estimates, the WG has examined the two most important consumption estimates—those created by Abt Associates and by the interagency committee for the Global Heroin Threat Assessment—and concluded that we could not improve upon those estimates.

A supply-based estimate of US heroin consumption by definition must use as a starting point estimates for Colombian and Mexican heroin production because those countries supply the bulk of our heroin. The only reliable production estimates are the imagery-based crop surveys conducted by CIA's Crime and Narcotics Center (CNC). The WG's approach was to first assume that all Mexican and Colombian heroin production was destined for the US.[8] The next step was to use an estimated ratio of Latin American-to-Asian heroin in the US to scale that up to an overall estimate of heroin in the US. Depending on whether the ratio used is based on the DEA Heroin Signature Program or US Customs seizure data, the estimate this procedure yields is 13 – 15 metric tons.

The 13 – 15 metric ton range calculated with the supply-based estimate is not inconsistent with the Abt Associates consumption estimate for 2000 (13.3 MT), but there are irreconcilable problems with the data. Specifically, the ratio of Mexican-to-Colombian heroin is severely inconsistent between the two main components necessary for estimating availability:

(1) CNC production estimates indicate that Mexico produced much more heroin than Colombia in most recent years;

(2) DEA Heroin Signature Program & US Customs seizure data show the opposite.

[6] Abt Associates, Inc., *What America's Users Spend on Illegal Drugs*, US GPO, December 2001.
[7] *Global Heroin Threat to the United States*, CNC, July 2000.
[8] This assumption is not 100% true but the errors caused by using it are small compared to the other uncertainties in the data.

The WG is not able to resolve the inconsistency at this time, concluding that a reliable heroin availability estimate based on this supply approach is impossible to create with the data available. Absent other data on heroin production or movements, any other supply-based approach would also contain the same inconsistencies.

The WG evaluated the consumption-based estimates by Abt Associates and the interagency estimates from the Global Heroin Threat Assessment and concluded that we could not improve upon that work in just a few months. Both of these are the result of serious, long-term efforts, which struggled to create complicated estimates with inadequate data and extensive assumptions. We determined that our estimate would have to be a range. Using the most recent estimates from these two sources, US heroin consumption in 2001 is estimated at 13 to 18 metric tons.

Nonetheless, estimates of total US heroin consumption are probably an ineffective tool for measuring year-to-year changes in counterdrug performance effectiveness. The WG believes, for example, that it is unlikely that a consumption estimate for 2002 will change significantly from 2001's estimate. The best numbers available are the Global Heroin Threat Assessment estimate (for 1999) and the Abt Associates estimate (for 2000). The statistics that form the basis for these estimates are not likely to change significantly from year to year.

The Heroin Availability WG has five recommendations for future responses to the difficulties of measuring US heroin consumption; these will be detailed in the next section of this report.

The remaining sections of this report will describe various heroin-related statistics produced by the US government and describe the inconsistencies between them. The following statistics provide some indication of the proportions of heroin in the US from the different source areas (Mexico, Colombia, SW Asia, and SE Asia):

(1) Opium Poppy Cultivation and Heroin Production Estimates (CNC);

(2) Treasury Enforcement Communications System Drug Seizure Data (USCS); and

(3) Heroin Signature Program (DEA).

Also relevant to the proportions of heroin from different source areas is the proportion of users east and west of the Mississippi. Those in the eastern US are generally considered to use higher purity powder heroin (primarily Colombian); those in the west are considered to use mainly Mexican black tar heroin. The proportions of users for each type provide an indication of how much is used from each source area. Specifically, an inconsistency exists if most of the heroin is thought to be in the West, but most of the users are thought to be in the East. Considerable evidence suggests that the greatest numbers of heroin users are located in the densely populated urban centers of the northeastern United States, a drug market dominated by South American heroin. At this time, however, there are no official regional estimates of heroin users. The report will describe a statistic that combines the DAWN emergency room admissions with the Domestic Monitor Program (DMP) results. This combined DAWN-DMP statistic serves as a proxy for estimating the proportion and heroin preference of heroin users in the eastern and western US.

After describing the statistics and inconsistencies relevant to a supply-based estimate of heroin available for consumption, the final section of this report will describe the two consumption estimate models that form the basis for the WG's estimate.

Recommendations

The Heroin Availability WG has five recommendations for future responses to the difficulties of assessing the US heroin situation.

1) **Consider using more easily measurable statistics than availability and consumption as indicators of counter-narcotics success.** Availability and consumption are among the most difficult counter-narcotics statistics to estimate accurately. If the object of these drug availability studies is to provide a measure of performance effectiveness, then statistics other than availability or consumption may be more reliable and more useful. There is no direct way to estimate a nation's narcotics consumption; it can only be estimated by first estimating many of the following statistics: chronic and casual user population sizes, dosages, purities, the amount of money spent on drugs, the percentage of drugs obtained by non-cash transactions, etc. Each of these estimates has its own sources of error and this error is compounded when the estimates are put together to create a consumption estimate.

If knowing US drug availability is important for its own sake, then it would make sense to invest additional resources in creating a program to estimate it. If the main purpose is to use it as a measure of counter-narcotics effectiveness, however, the WG recommends using several data sources which cover a wide range of narcotics issues. These indicators include:

- DAWN (SAMHSA);
- NHSDA (SAMHSA);
- MTF (Nationl Institute on Drug Abuse [NIDA]);
- ADAM Program (National Institute of Justice);
- PRIDE Survey;
- DEA data on heroin price and purity.

2) **If a nationwide consumption estimate has intrinsic value beyond its use in measuring effectiveness, a program should be created to annually estimate at least the number of chronic and casual users in each section of the country.** The Working Group believes a nationwide consumption estimate has considerable value in its own right and strongly recommends its creation.

There is much basic information that the US government does not have on our heroin user population. These information gaps include:

- The number of users in the eastern US (primarily powder) vs. the number in the western US (primarily black tar);
- The quantities used by powder and black tar users (we don't even know if the quantities are the same or different);
- The number of users by method of use (injection, smoking, or snorting).

A program to measure these will be neither easy nor cheap, but it is essential to constructing valid consumption estimates. This will require a program with innovative approaches to measuring the number of users; cobbling together pre-existing statistics is not sufficient to solve this difficult problem. Moreover, estimating the numbers of chronic and casual users would be the minimum solution. Ideally,

the program would estimate the numbers of more precisely-defined categories of users; i.e., categorizing heroin users by method (injection, smoking, or snorting) and by frequency of use or dosage.

Creating such a program would have to be done by an organization like the SAMHSA; this is not in the purview of law enforcement or intelligence organizations. To be done properly, this effort would require a minimum of two years before estimates could be published and an annual budget on the order of that for SAMSHA's NHSDA.

3) **The agencies responsible for publishing statistics on heroin should examine their programs to determine if those statistics need improvements or changes to make them more useful to policymakers.** Specifically, the agencies publishing statistics that appear to be contradicted by other agencies' figures should make an attempt to explain and resolve the inconsistencies discussed in this report.

4) **Undertake an effort to measure the heroin laboratory processing efficiencies in important producing countries.** Opium yield studies provide a crucial first step in estimating a country's heroin production based on its opium poppy cultivation, but it is also necessary to estimate the processing efficiencies of the country's heroin labs to estimate heroin production as accurately as possible.

5) **The working group recommends that enhanced staffing and resources be provided to the DEA Special Testing and Research Laboratory to pursue proven scientific methodologies—such as isotopic-ratio analysis—that will provide the means to confirm the geographical origin of heroin with an extremely high confidence rate.** Isotopic ratio analysis is based on the fact that unique ratios of carbon and nitrogen isotopes exist in coca and opium poppy plants for different local regions. These differences are retained in the finished cocaine or heroin and, therefore, can provide a "chemical fingerprint" to geo-source cocaine or heroin seized anywhere in the world. (Current signature programs are designed to identify manufacturing processes, taking advantage of source area differences in infrastructure and processing expertise. Consequently, a Colombian "cook" processing Mexican opium in Mexico might not produce heroin with clearly Mexican signature.)

CNC Production Estimates as an Indicator of Source Areas

Heroin is smuggled to the United States from all four of the major source areas: Mexico, Colombia, Southeast Asia (SEA), and Southwest Asia (SWA). Each of these source areas has dominated the US heroin market at various points over the last three decades. Currently, heroin from Colombia and Mexico dominates the US market. Although the US receives some heroin from SEA and SWA, most of the heroin from their regions goes to other world markets.

Integral to reporting on heroin sources of supply are cultivation and heroin production estimates created by CIA's CNC. CNC's imagery-based sample surveys of the opium poppy crops provide the foundation for the US Government's heroin production estimates. In the case of Colombia, CNC's estimate of the number of hectares under cultivation is used with DEA's estimate of the amount of heroin produced from a hectare of Colombian poppy. In the Mexican case, CNC is currently conducting an Opium Yield Survey to measure for the first time the amount of opium gum that can be harvested from a hectare of Mexican poppy. The ongoing bi-national Opium Yield Survey has improved the reliability of Mexico's heroin production estimate.

In all of the CNC crop surveys, growing areas are defined using all-source intelligence. A random sample of each area is taken using classified satellite imagery. The area of the narcotics crop is identified and measured in the sample; this sample area is then scaled up to the entire growing area. The cultivation estimates in hectares are then converted to metric tons of pure heroin using the conversion factors. These estimates are potential production estimates; that is, the estimated production if all of the poppy crop were converted to heroin.

The CNC estimates for potential heroin production (metric tons of 100% pure heroin) for the last three years are:

Table 2 - 1 Potential Heroin Production in Latin America

	1999		2000		2001	
	MT	Percent	MT	Percent	MT	Percent
Mexico	6	65%	3	48%	7	62%
Colombia	3.3	35%	3.2	52%	4.3	38%
Total Latin America	9.3	100%	6.2	100%	11.3	100%

*Cloud cover precluded an estimate in 2000; the 3.2 MT is a weighted average of previous years' production.

Other poppy cultivation in South America: Small fields of opium poppy cultivation have been seen in other South American countries, most notably in Venezuela along its northern border with Colombia and in Peru within its northern mountainous regions. Effective and sustained eradication in Venezuela has kept cultivation under 50 hectares. Although opium poppy cultivation has increased recently in Peru, the Peruvian government eradicated almost 100 hectares in 2001 and has tasked its Interior Ministry with identifying and eradicating future cultivation. Although Peruvian authorities seized a morphine processing laboratory in Peru in June 2000, there is no indication of heroin production in Peru to date. DEA reporting to date indicates that heroin violators who control both the cultivation and processing of heroin in South America are almost exclusively Colombian nationals. Heroin related activity in South America, but outside of Colombia, is limited to small opium poppy cultivation, opium latex collection and transportation of heroin.

Asian Heroin

Although Latin America is the primary source for heroin entering the United States, Southeast and Southwest Asia remain the world's largest source of opium and heroin production. Despite the fact that the Asian opium crop was down 77 percent in 2001 (the lowest levels since estimates began in the mid-1980's), total opium production totaled 1,165 metric tons with the potential to manufacture some 98 metric tons of heroin. The Taliban's poppy ban removed Afghanistan from its status as the world leader in opium production, a position it had held since 1998. Opium production from Afghanistan dropped from over 3500 metric tons in 2000 to about 74 metric tons in 2001. The recent regime change in Afghanistan, however, will likely lead to a rebound in opium production in 2002. In Southeast Asia, Burma remains the largest producer of opium, producing an estimated 865 metric tons in 2001, down 220 metric tons from the previous year's crop of 1085 metric tons. Production in neighboring Laos reached an estimated 200 metric tons in 2001.

Opium production figures for Asia underscore the continued importance of this region as a global source of opium and heroin production. Although Latin America now produces the majority of the heroin destined for the United States, Asian production could satisfy US demand for heroin should the Latin American supply suffer a significant disruption. The market for US heroin has gone through many

cycles, with Southwest Asian heroin dominating the market in the 1960's and early '70's, then Southeast Asian heroin in the '80's and mid-1990's. While Latin American heroin currently dominates the US market, the majority of the world's opium and heroin production remains in Asia. Should a disruption through either enforcement or weather occur in Latin production, the Asian market would be able to fill much of the US demand as it did in the past.

DEA Heroin Signature Program as an Indicator of Source Areas

DEA's Heroin Signature Program (HSP) provides the best available and only scientifically-based estimate of the source areas of heroin encountered in the U.S. drug market. Initiated in 1977, heroin signature analysis is based on an exhaustive chemical profile of authentic samples acquired from each of the four major heroin source areas: Mexico, South America (Colombia), Southeast Asia (principally Burma) and Southwest Asia - Middle East (principally Afghanistan).

The DEA Intelligence Division's HSP looks at the wholesale side of the domestic heroin trafficking situation. Included in the program are samples drawn from seizures at ports-of-entry – these provide insight into the routes and methods used to smuggle heroin into the country. Randomly selected seizures and purchases throughout the United States also are sampled. They provide a glimpse into wholesale distribution patterns within the country.

To understand how the HSP works, it is essential to understand that heroin source area identification is principally a heroin manufacturing process identification. Producers in the major heroin source regions use processing techniques that differ significantly because of differences in infrastructure and expertise. The program is continually validated by associating source country authentic samples and intelligence reporting with the results of chemical analysis.

Heroin signature analysis is conducted at DEA's Special Testing and Research Laboratory (STRL). The DEA Intelligence Division uses the data derived from heroin signature analysis done at STRL on domestic heroin samples, to populate two trafficking indicator programs – the HSP and Domestic Monitor Program (DMP) – developed to detect trends in heroin source area. These programs differ in their sampling methods and the insights into the heroin market that they provide. (The DMP is discussed in more detail later.) In both programs samples are subjected to in-depth chemical analysis to determine, among other things, the geographic source area of the heroin. A description of HSP and DMP data analyzed for this study follows.

Each year, through the HSP, an in-depth chemical analysis is performed on an average of 600 to 900 samples taken from heroin seizures and purchases made in the United States. As a result of the chemical analysis, DEA chemists are able to associate the heroin samples with a heroin production process, or signature, which is indicative of a particular geographic source area. The resulting proportions for each source area are measured in terms of the net weight of heroin seized and analyzed in the program. HSP 2000 results indicate that 59 percent of the sampled heroin was from South American (SA) sources of supply, while 17 percent was from Mexico, and 8 percent and 16 percent were from Southeast Asia and Southwest Asia, respectively[9].

[9] It is important to note that, because HSP results are based on seizure data, fluctuations from year to year in the proportion from each source area may reflect shifting drug law enforcement priorities and significant seizures, as well as changing smuggling patterns. In addition, large seizures of heroin from one source area may boost that source area's representation in the HSP. Therefore, the HSP results may or may not be representative of the actual amount of heroin available in the United States from each source area.

Table 2 - 2 HSP - Heroin Source Area Identification (in percent)

	1999	2000
South America	60%	59%
Mexico	24%	17%
Latin America	84%	76%
Southeast Asia	10%	8%
Southwest Asia	6%	16%
Asia	16%	24%

Note: 2001 HSP data are not yet available.

HSP samples and independent investigative intelligence indicate that the majority of the heroin in the United States is powder, primarily from South America, and a lesser amount is Mexican-source heroin. Since 1994, data from DEA's HSP has identified South America, primarily Colombia, as the major source area for high-purity powder heroin destined for the principal eastern U.S. drug market. In large measure, Colombian heroin has displaced white heroin from SEA and SWA sources.

USCS Seizures as an Indicator of Source Areas

The Working Group used US Customs Service heroin seizure data to estimate the proportions of Latin American heroin versus Asian heroin seized.[10] To accomplish this, we aggregated USCS seizures into four categories based on the origin of the conveyance: Mexican, Colombian, Southeast Asian, and Southwest Asian. Placing the seizures into these four categories by origin is far from perfect since some Colombian heroin may pass through Mexico, for example, but it should provide a rough idea of the proportions of heroin from each region of the world.[11]

The seizures are aggregated by weight into these categories based on the geographic origin of the passenger or conveyance:

Table 2- 3 – Categorization of Conveyance Origins

Category	Geographic Origin of Conveyance*
Mexico	Mexico only
Colombia	All other (non-Mexican) Latin America and the Caribbean
Southeast Asia	SE Asia, Bangladesh, East Asia, Australia and Oceania
Southwest Asia	SW Asia, South Asia, Middle East, FSU, Europe and Africa

[10] The WG's interpretation of USCS data is not necessarily the same interpretation that US Customs would use. For example, our interpretation of the USCS data assumes that all heroin seized coming out of Mexico was produced in Mexico and that all heroin seized from Caribbean conveyances was produced in Colombia. Clearly, this is not 100 percent true and the USCS would not make any such claim. For our analytic purposes, however, these assumptions are close enough to reality to give us a rough measure (which does not rely on chemical testing) of the sources of heroin entering the US.

[11] As with the HSP, seizures may or may not be representative of all heroin in the United States since the proportion seized from each source area may reflect shifting law enforcement priorities as well as changing trafficking patterns.

*Seizures of unknown origin and from Canada are excluded.

This analysis of USCS seizure data gives us the following percentages for each source area:

Table 2-4 – Percentage of Geographic Origins of Conyenances where Heroin was Seized by USCS

	1999	2000	2001
South America	56%	59%	75%
Mexico	22%	16%	14%
Latin America	78%	75%	89%
Southeast Asia	1%	3%	3%
Southwest Asia	21%	22%	8%
Asia	22%	25%	11%

DAWN and DMP Data Combined as a Measure of Heroin User Location

As discussed in the Overview, one of the inconsistencies hampering the supply-based estimate of heroin available for US consumption is that one set of statistics could be interpreted as implying that most of the heroin is destined for the western US while another set indicates that most of the users are in the eastern US. Specifically, in 2001, USG sources estimated that only 4.3 of the 11.3 metric tons of Latin America-source heroin was produced in Colombia. A question naturally arises as to the ability of Colombian heroin (38 percent of Latin American production) to adequately supply the major white powder market east of the Mississippi River.

The purpose of this section is to describe analyses that combine DAWN and DMP data to create approximate measures of:

1) the split of heroin users between the eastern and western US; and

2) the proportion of users who use heroin from each of the four major source areas.

This section will start with descriptions of the individual DMP and DAWN programs and conclude with a description of the statistic created by combining information from them.

Domestic Monitor Program – Data Description

The DMP is a heroin purchase program designed to provide trend data on the purity, price, and origin of retail-level heroin available in the open-air drug markets in 23 major metropolitan areas of the United States. Each quarter, DEA provides funding for the undercover purchase of retail-level heroin in the same 23 metropolitan areas. Each heroin purchase subsequently undergoes chemical analysis to determine the purity and, if possible, the geographic source area of the heroin. Particular attention is paid to the DMP results for New York City because it is the nation's largest heroin market, and also because much of the heroin available in other east coast cities is obtained in New York.

The DMP was initiated in DEA's New York Field Division in 1979, and now includes one city in every DEA field division. Baltimore was included as a DMP participant in early 1995, Orlando in late 1996, and El Paso in mid-1999.

Since its inception, the DMP has proven to be a valuable indicator for detecting trends in retail-level heroin trafficking in each of the 23 cities where the program exists. For example, in the early to mid-1980s, the DMP documented the increasing availability of Southeast Asian heroin at the retail level in a number of U.S. cities. More recently, data from the DMP have revealed significant increases in the amount of South American heroin available at the retail level, particularly in the metropolitan areas of the northeastern United States.

Intelligence gained from the DMP indicates that there are two distinct retail heroin markets in the United States. On the East Coast -- particularly in the Northeast where the largest U.S. heroin user population is located -- South American heroin dominates the market. Colombian traffickers clearly targeted this lucrative market for white powder heroin (once dominated by heroin from Southwest Asia and through the mid-1990s from Southeast Asia) by offering high purity heroin at low prices. West of the Mississippi, the market continues to be dominated by Mexican black tar heroin and, to a lesser extent, brown heroin**.**

NOTE: The DMP is not a probability sample and was never designed to provide a nationwide estimate of the source areas for heroin; the program exists to provide a good profile over time of each of the 23 local heroin markets. The number of heroin purchases made by each of the DEA field divisions is predefined by the guidelines of the DMP program in order to assure sufficient numbers of samples for trend analysis. All DMP program sites are required to make 10 retail purchases per quarter regardless of the local user population; only New York makes 20 purchases per quarter. Because the number of samples is preset, the simple number of samples alone describes the local situation only. (In New York, for example, South American heroin is predominant, while Mexican heroin dominates the Phoenix heroin market.) Moreover, because a greater number of DEA field divisions are located west of the Mississippi, a simple total of the number of DMP samples from each source area will result in an over-representation of western heroin.

An examination of the proportion of heroin purchases identified by source areas, however, does provide insight into the source of heroin sold locally in the various metropolitan centers. These heroin source area proportions will be applied to the number of heroin users who sought emergency medical treatment (as contained in DAWN ER data) in order to construct a model apportioning the number of users who ingested South American heroin, for example, compared to the number using Mexican heroin.

DAWN – Data Description

The DAWN is a large-scale data collection system implemented in 1972 and designed to be an indicator of the severity, scope, and nature of the nation's substance abuse problem. Emergency department trends from DAWN provide data on the incidence of drug abuse related episodes from participating hospital emergency rooms (ER) for the coterminous United States and for 21 metropolitan areas. Moreover DAWN Medical Examiner (ME) data report drug-induced and drug-related deaths across the United States. DAWN ME data do not represent the nation as a whole, rather, they reflect the number of drug abuse deaths identified and reported by participating examiners and coroners in selected metropolitan areas. Nonetheless, these data can be used to monitor changes over time. DAWN is managed by SAMHSA.

DAWN and DMP Data Combined as a Measure of Heroin User Location

The WG analyzed DAWN heroin-related ER and ME data to describe where U.S. heroin users are located and assumed that the data roughly represent the number of heroin users in selected metropolitan areas. The number of DAWN heroin-related ER mentions will be used to represent the user population in the DAWN ER/DMP heroin user profile model described below.

DAWN ER and DMP Heroin User Concept Model

Background***:*** The WG, seeking additional insight regarding U.S. heroin users, looked beyond the usual applications of the two national data sets described above.[12] The combined DAWN ER/DMP heroin user concept model developed for this heroin availability report classifies the number of heroin users in selected cities who required emergency room treatment according to the proportion of local street purchases identified by heroin source area. The DAWN ER/DMP heroin user model will provide insight into several aspects of the U.S. heroin market:

- the proportion of the user population that can be assumed to use Mexican heroin;
- the proportion of the user population that may be assumed to use powder heroin; and
- the consistency of those proportions with our understanding of the current situation.

Methodology***:*** The DAWN ER/DMP heroin user concept model provides insight into the relative magnitude and location of U.S. heroin users, as well as the proportion of those addicts who use Mexican heroin (primarily the black tar form of heroin) compared to non-Mexican (SA/SEA/SWA) powder heroin. The model quantifies the number of heroin users in a particular geographic location using data from SAMHSA's DAWN and the source of their heroin using data derived from DEA's DMP. The DAWN and DMP are two of the primary indicator programs that assess U.S. heroin abuse and trafficking trends; each of the data sets collects long term heroin-related trends in major metropolitan centers.

NOTE: The distribution of heroin users in the DMP and DAWN reporting cities may or may not be the same as the distribution in the United States as a whole. Nevertheless, the WG believes this provides a rough approximation of the proportion of Mexican heroin users versus all other heroin users as well as a general approximation of the proportions of users in various geographic locations.

The heroin user concept model only includes metropolitan centers that participate in both the DMP and DAWN systems. The model uses the number of heroin-related emergency room mentions for metropolitan centers that participate in DAWN to get a snapshot of where heroin users are located and uses DMP to estimate the source of heroin they use.[13]

Example**:** The following is an explanation of the methodology used in Attachments 1 and 2 to aggregate users admitted to ER's by the source area of their city's heroin. In Atlanta, for example, a total of 21 DMP purchases were made in 1999, of which 18 were identified by heroin source area, and 3 were not. Of the 18 classified samples, 50 percent were identified as Southeast Asian; 5 percent were Southwest Asian; 39 percent were South American, and 5 percent were Mexican source heroin. These heroin source

[12] After conducting this research, the Working Group later discovered that Abt Associates had performed similar calculations for the same purpose.

[13] Time constraints allowed only a comparison of 1999 and 2000 DMP and DAWN data; please refer to Attachments 1 and 2 -- DAWN ER / DMP Heroin User Concept Model -- for detailed data.

area percentages were then multiplied by the number of heroin-related emergency room visits to divide up Atlanta heroin users who visited ER's by the probable source of their heroin. DAWN reported a total of 415 ER heroin-related mentions in 1999. Using the DMP source area percentages, ER mentions in Atlanta are apportioned as follows:

Total DAWN heroin-related mentions in Atlanta:	415
Southeast Asian Heroin = 50%:	208
Southwest Asian Heroin = 5%:	23
South American Heroin = 39%:	161
Mexican Heroin = 5%	23

The ER mentions thus aggregated by probable heroin source area were then sub-totaled and divided by total metropolitan ER mentions to yield the percentage of heroin mentions identified as to source area. In 1999, for example, 12,440, or 22 percent of the 56,169 total ER mentions, were apportioned to Mexican heroin users.

The following chart summarizes the heroin source area percentages derived from the combined DAWN ER and DMP Heroin User Concept Model.

Table 2 - 5 Heroin Source Area Identification (in percent)

	1999	2000
South America	69%	72%
Mexico	22%	20%
Latin America	91%	92%
Southeast Asia	7%	1%
Southwest Asia	2%	7%
Asia	9%	8%

CNC Production Estimates – Comparison with Other Data

The CNC production estimates for Colombia and Mexico in 2001 are 4.3 and 7 metric tons of pure heroin, respectively. These figures, which indicate that nearly two-thirds of Latin American heroin is from Mexico, are in conflict with other statistics which the WG has examined, including the HSP and the WG's analysis of USCS seizures. The HSP, for example, sources 17% of US heroin to Mexico and 59% to South America (primarily Colombia) in 2000. The WG's analysis of USCS seizures in the same year sources 16% to Mexico and 59% to Colombia. This inconsistency is predicated on the assumption that virtually all Latin American heroin goes to the US market.

The magnitude of the inconsistency between the CNC production estimates for Mexican and Colombian heroin and the statistics from the HSP and the USCS seizures would require unreasonable assumptions to reconcile (e.g., CNC's satellite imagery has missed 50 percent of the growing area in Colombia, or the preliminary results of the Opium Yield Survey in Mexico are overstated by a factor of at least two). The likelihood of such assumptions being valid seems remote, and under reasonable ranges of error in the estimating process the inconsistency remains. Thus, there must be other factors responsible for the inconsistency in these data sets. What these factors are is a matter of considerable speculation. It is important to note that, because HSP and USCS figures are based on seizure data, fluctuations from year

to year in the proportion from each source area may reflect shifting drug law enforcement priorities, relative seizure rates, as well as changing smuggling patterns. In addition, large seizures of heroin from one source area may boost that source area's representation in seizure data.

The inconsistency between the production figures and the HSP data came to light only within the last few months. The recently-released production numbers are the first such estimates produced after the completion of Operation Breakthrough in Colombia and the Opium Yield Survey in Mexico. (Because of the difficulties of conducting scientific surveys in these dangerous growing areas, past production estimates have used studies that were dated or from other parts of the world.) The previous production estimates were not sufficiently different from the HSP data to reveal any inconsistencies.

In Colombia, Operation Breakthrough revealed that only two opium poppy crops are grown annually in all but one growing region rather than the three crops previously assumed. Moreover, Operation Breakthrough's opiate laboratory efficiency study has greatly increased the accuracy of the conversion factor that converts Colombian opium poppy estimates into Colombian heroin estimates.

In Mexico, by contrast, a number of variables remain unknown, including the forms of opium used to process various types of Mexican heroin, the amounts of opium required to produce one kilogram of heroin, and the overall efficiency of the conversion process. The Opium Yield Survey numbers for Mexico improved greatly in 2001 as a result of a scientific Mexico/US bi-national survey; the updated preliminary figures raise previously published production data between 33 and 50 percent.

Undertaking a study of Mexican opiate laboratory efficiency is a recommendation of this Working Group. It is possible that a laboratory efficiency study of Mexican heroin production may account for some of the inconsistency between the Mexican and Colombian heroin production estimates. Mexican heroin processors are generally thought to use a processing technique that is less sophisticated than the Colombians, and it is, therefore, possible that the actual processing ratio for Mexico could be different than the presumed ten to one conversion ratio. However, the actual ratio cannot be determined unless an opium laboratory efficiency study is undertaken for Mexico.

Background on Operation Breakthrough

The DEA Operation Breakthrough heroin program for Colombia determined that farmers in all but one of Colombia's opium poppy growing areas cultivate two crops per year. Previous US Government estimates—based on the best but limited information available—assumed Colombian farmers cultivated three opium poppy crops per year. Likewise, Operation Breakthrough estimated that Colombian opiate processors are about 67 percent efficient in the overall process of converting opium latex into heroin. In other words, the typical Colombian heroin processor requires 24 kilograms of opium latex to produce one kilogram of 100 percent pure heroin.

With approximately 6,540 hectares of opium poppy under cultivation in 2001, Colombia potentially produced 104 metric tons of opium latex. At a 24:1 opium latex to heroin conversion ratio, Colombia potentially produced 4.3 metric tons of 100 percent pure heroin in 2001. Wholesale-level Colombian heroin seized by the U.S. Customs Service in 2001 had an average purity of 84.5%. Accordingly, 4.3 metric tons of 100 percent pure heroin would translate into some 5.1 metric tons of "export quality" heroin.

Comparison of USCS and HSP Data

The following chart shows that USCS and HSP percentages are very similar for Colombian and Mexican heroin. HSP figures are available for 1999 and 2000 and USCS figures for 1999, 2000, and 2001. The USCS and HSP figures both indicate that Colombian heroin represents the majority of heroin supplied by Latin America. These figures are not consistent with the CNC production estimates for Colombia and Mexico, which indicate that there is much more Mexican heroin produced than Colombian heroin.

Table 2 - 6 Heroin Source Area Identification (in percent)

Comparison of USCS and HSP: 1999 - 2001

	1999		2000		2001
	USCS	**HSP**	**USCS**	**HSP**	**USCS**
South America	56%	60%	59%	59%	75%
Mexico	22%	24%	16%	17%	14%
Latin America	78%	84%	75%	76%	89%
Southeast Asia	1%	10%	3%	8%	3%
Southwest Asia	21%	6%	22%	16%	8%
Asia	22%	16%	25%	24%	11%

.

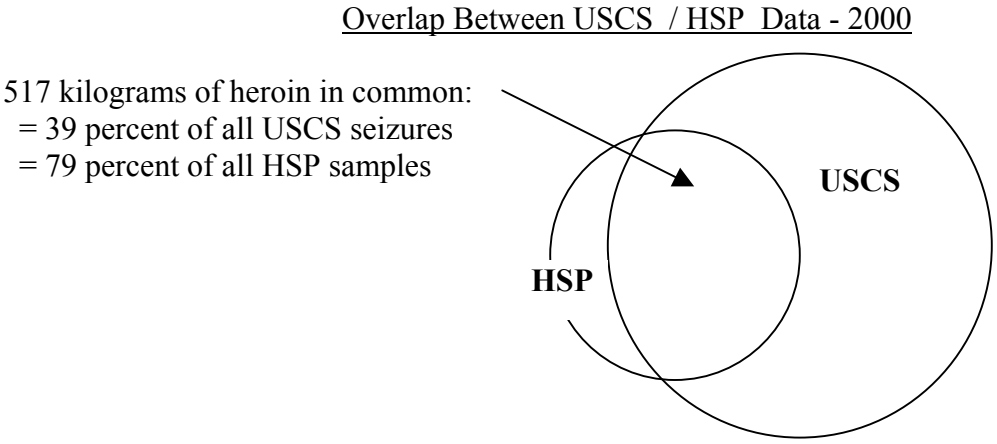
The breakout of USCS and HSP percents for Asian heroin between SWA and SEA are not as close, but this discrepancy can be explained to a certain extent by the smuggling patterns related to those seizures. For a number of years, West Africans have trafficked in both SWA and SEA heroin. Moreover, Bangkok-based Nigerian traffickers often purchase heroin in Pakistan and return to Thailand where their couriers depart from Bangkok to foreign drug markets. For these reasons, the point of origin of the seized shipment, which the Working Group used to identify the source of the heroin seized by USCS, can be misleading.

NOTE: It is important to note that USCS and HSP are independent to a large degree, but not entirely. Although the Working Group's use of the USCS data does not rely on a chemical analysis of the heroin to source it, a portion of the heroin seized by the USCS is included in the heroin analyzed in the HSP. For example, in 2000, 517 kilograms of the USCS seizures were analyzed in the HSP—this amount represented 39 percent of all USCS heroin seizures and 79 percent of all the heroin analyzed in the Heroin Signature Program. (USCS seizures accounted for 67% of HSP samples by net weight in 1999.)

DAWN Data Combined with DMP – Comparison with Other Data

By combining heroin source area data derived from seizures (USCS, HSP and DMP) with data pertaining to the health consequences of heroin use (DAWN), the Working Group hoped to further illustrate the consistencies and inconsistencies between data sources. Strategic indicators (HSP and DMP) and investigative intelligence have long indicated the existence of two relatively distinct heroin markets in the United States: higher-purity powder heroin in the East and Mexican heroin, primarily black tar, in the West. Moreover, considerable evidence on the health consequences of drug use (DAWN ER and ME reporting) suggests that the greatest number of heroin users is located in the densely populated urban centers of the northeastern United States, where the heroin market is dominated by South American heroin.

Figure 2-1 - Overlap Between USCS/HSP Data - 2000



The following chart summarizes HSP, USCS and DAWN ER/DMP percentages. It breaks out the data by individual source area, i.e., Southeast Asia, Southwest Asia, South America (Colombia), and Mexico.

Table 2 - 7 Heroin Source Area by Region (in percent): 1999-2001

	1999			2000			2001
	USCS	HSP	DAWN ER/DMP	USCS	HSP	DAWN ER/DMP	USCS
South America	56	60	69	59	59	72	75
Mexico	22	24	22	16	17	20	14
Latin America	78	84	91	75	76	92	89
Southeast Asia	1	10	7	3	8	1	3
Southwest Asia	21	6	2	22	16	7	8
Asia	22	16	9	25	24	8	11

NOTE: The next chart further summarizes the data by the type of heroin (white powder vs. Mexican, primarily black tar). The emphasis on non-Mexican (white powder) vs. Mexican-source heroin not only reflects the significant differences between the eastern and the western U.S. heroin markets, but also clearly delineates the conflict between the several data sources examined elsewhere in this report regarding Latin America-source heroin. Despite considerable differences between estimates for the individual, non-Mexican heroin source area percentages (i.e., SEA, SWA, and SA), there is remarkable consonance in the summary data percentages based on the type of heroin.

Table 2 - 8 Heroin Source Area by Type (in percent): 1999-2000

Non-Mexican/Powder vs. Mexican/Primarily Black Tar

Data Source	Non-Mexican (SEA/SWA/SA) White Powder		Mexican Primarily Black Tar	
	1999	2000	1999	2000
USCS	78	84	22	16
HSP	76	83	24	17
DAWN ER/DMP	78	80	22	20

DAWN ME / ER Comparison

The Working Group also analyzed DAWN Medical Examiner reporting on heroin-related deaths for 1999 and 2000. The comparison of heroin-related ME and ER data by U.S. geographic region (i.e., East versus West) is detailed in Attachments 3 and 4. In general, the greatest number and percent of both deaths and emergency mentions[14] for heroin occurred in the eastern United States. In 2000, for example, 65 percent of heroin-related deaths and 80 percent of emergency room mentions were reported in eastern metropolitan areas.

Table 2-9 - DAWN ME/ER Regional Comparison

Location	1999		2000	
	Deaths	ER Mentions	Deaths	ER Mentions
United States - Total	4,820	56,169	4,832	62,511
Eastern U.S. – Number	2,782	43,916	3,120	49,988
Eastern U.S. – Percent	58%	78%	65%	80%
Western U.S. – Number	2,038	12,253	1,712	12,523
Western U.S. – Percent	42%	22%	35%	20%

Of particular note was the significant proportion of heroin-related deaths and emergency room mentions reported in 1999 by DAWN cities in the West. The increases in these deaths and ER mentions parallel increases through the late 1990's in the purity of Mexican source heroin that dominates the drug market in the western United States. In Dallas, for example, 80 heroin-related deaths were reported in 1999, compared to 94 in 2000. The purity of Mexican heroin in this city rose from 7 percent in 1997 to 15.19 percent in 1999. Street-level heroin purity in Dallas declined to 14.81 percent in 2000.

As part of this analysis of DAWN ME and ER data, the predominant heroin source area was noted (in parentheses) for cities that also participate in the DEA DMP. The source area was derived from the percentage of retail heroin samples analyzed through the DMP that were classified as to source of origin. The DMP data demonstrate that South American heroin was the predominant type of heroin in urban centers east of the Mississippi River, while Mexican heroin dominated western heroin markets.

[14] The emergency room mention numbers used in this table and cited attachment are limited to those cities included in the DAWN ER/DMP heroin user concept model.

Consumption Estimates

Abt Associates Estimates of Heroin Consumption. Since 1991, ONDCP has published a biennial report on expenditures by Americans on illegal drugs. The current version of What America's Users Spend on Illegal Drugs 1988-2000, December 2001, completed by Abt Associates, Inc., provides comparable estimates of heroin consumption by Americans for the years 1988 through 1999, and projects estimates for 2000. The Working Group believes that the Abt Associates' study, which discusses the assumptions and in most cases outlines the procedures used, is the best effort to date to determine the amount of heroin consumed by Americans in the last decade. It is certainly the better-documented estimate of the two that the WG is using.

Abt Associates admits that because of the quality of available data, there is considerable imprecision in estimates of the number of chronic and occasional users of drugs, the retail sales value of their drug purchases, and the amount of drugs they consume. That said, they also believe that the data are sufficiently reliable to conclude that the trade in heroin has increased over the last ten years. Much of the increase is attributable to an increase of availability and a reduction in price.

The best estimates reported as a result of the study are the following:

- In 1999, about 900,000 Americans were chronic heroin users and about 250,000 were occasional heroin users.

- The number of chronic heroin users had decreased, perhaps due to the AIDS epidemic and increased incarceration, but that decrease had largely abated by the latter part of the decade, perhaps because new users were attracted by the availability of high quality low cost heroin.

- In 2000, Americans spent about $10B on heroin.

- During the latter part of the 1990's, Americans used close to 14 metric tons of heroin, which represents an increase over the amount used during the middle of the decade.

In order to determine the number of chronic drug users, Abt Associates used the Drug Use Forecasting (DUF) program. DUF is now the ADAM program, but the data used in the Abt study predate ADAM. DUF questions a sample of arrestees in 24 central city jails and lockups about their drug use. DUF also asks arrestees to voluntarily produce specimens for urinalysis. This confirms whether the interviewees have used any of up to 10 types of drugs during the two to three days before the interview. Urinalysis adds credence to estimates of drug use when self-reports are unreliable.

The occasional user was measured by using the NHSDA, the nation's most comprehensive survey of drug use. The NHSDA measures drug use among the American household population age 12 and older, as well as among people living in group quarters and in the homeless shelters. The NHSDA is not appropriate to measure chronic users because it misses those chronic drug users who, although not homeless, are too unstable to be considered as part of a household.

The results of their calculations is outlined in the following table:

Table 2 - 10 Estimated Number of Occasional and Chronic Users of Heroin (thousands), 1994-2000

	1994	1995	1996	1997	1998	1999	2000
Heroin Occasional	281	428	455	597	253	253	253
Heroin Chronic	932	923	910	904	901	898	898

The next step for the Abt study was to estimate how much Americans spend on heroin. The DUF data provided an estimate of how much chronic users spend on drug purchases per week. This requires an estimate of the prevailing retail prices for illicit substances. Dividing the estimate of retail sales value by the prevailing price paid by users gives an estimate of the total amount of drugs purchased, and this amount can be converted readily into metric tons units. The following chart compares the amount of heroin used by Americans from 1994 to 2000.

Table 2 - 11 Total Amount of Heroin Consumed, 1994-2000 (in metric tons)

	1994	1995	1996	1997	1998	1999	2000
Heroin	10.8	12.0	12.8	11.8	14.5	14.3	13.3

A copy of the complete Abt study, What American's Users Spend on Illegal Drugs 1988-2000, December 2001, can be found on the ONDCP web site. http://whitehouse drug policy.gov/publications/drugfact/american_users_spend/

NDIC Estimate of Heroin Consumption

The National Drug Intelligence Center (NDIC) created an estimate of US heroin consumption for the Global Heroin Threat Assessment. NDIC used data from ethnographic, epidemiological, and law enforcement sources to formulate a consumption-based equation that yielded an estimate of 18.84 metric tons for domestic heroin consumption. The equation includes assumptions regarding the number of hardcore heroin users, daily usage frequencies, monthly usage frequencies, and dosage. NDIC's calculation was based on an estimate of 980,000 hardcore heroin users, a figure derived from a 1999 study sponsored by ONDCP. Usage frequency was determined to be twice daily and was based on information derived from interviews with treatment personnel. Monthly usage frequency was based on data from the Treatment Episodes Data Set (TEDS) which indicated that of the individuals in treatment for heroin abuse, 83 percent used daily, 4 percent used between three and six times per week, 1.8 percent used between one and two times per week, 2.2 percent used between one and three times per month, and 9 percent did not use in the month prior to treatment. The dosage amount was derived from a detailed analysis of data regarding heroin weights and purity levels as determined by the Domestic Monitor Program. The equation also took into account the premises that hardcore addicts consume approximately 75 percent of the heroin in the United States and occasional users consume the remaining 25 percent.

These are the details of NDIC's analysis:

For the Heroin Study, NDIC developed an approach to estimate a range for domestic consumption of heroin. Their estimate was calculated by assuming the following two figures:

1) the number of hardcore users, N, based on the recent ONDCP study which showed 980,000 hardcore heroin users for 1998, and
2) dosage amount, D, based on an estimate from the DEA Domestic Monitor Program (23 mg).

A range of daily usage frequencies, F, were considered (based on reporting from treatment personnel), ranging from 2 to 4 times a day.

Hardcore usage frequency was based on 1996 national treatment admissions data[15] that determined the following:

Distribution of hardcore users (U)	weekly frequency	days/week	days of use/year (A)
83.0%	daily	7	365
4.0%	3-6 times	4.5	216
1.8%	1-2 times	1.5	72
2.2%	<1 time	.5	24
9.0%	no use	0	0

The above figures were combined according to (NxUxDxFxA)/ 10^9 to calculate the metric tons of heroin consumed by hardcore users who used heroin twice daily.

Distribution of hardcore users	Days of Use/ Year	Daily Dosage Frequency 2
83.0%	365	13.675
4.0%	216	0.389
1.8%	72	0.058
2.2%	24	0.024
9.0%	0	0.0
	hardcore mt sum (C)	14.13

Then assuming that hardcore heroin users consume 75% of all domestic consumption, the amount consumed by occasional users (O) can be calculated as C/3=O. Therefore, the total amount consumed by users who use twice daily can be estimated as follows:

User Type	**2**
Hardcore (H)	14.13
Occasional (O)	4.71
Total sum	18.84

The rough estimate reported in the Global Heroin Assessment[16] is:
980,000 users x 83% daily x 23mg/dose x 2 doses/day x 365 days/yr x 1/75% = 18 MT.

[15] Treatment Episode Data Set (TEDS) 1996
[16] Global Heroin Threat to the United States, CNC, July 2000

Table 2 – 14 DAWN ER/DMP Heroin User Concept Model: 1999

A Comparison of DAWN ER Heroin Mentions and DMP Retail Heroin Purchases
(User Numbers based on DMP Source Area Percentages)

City	Totals[17]	Data Source	Heroin Source Area					
			SEA	SWA	SA	MX	ID'D[18]	UC[19]
Atlanta	21	DMP[20]	9= .5	1= .05	7= .39	1= .05	18= .86	3= .14
	415	DAWN[21]	208	23	161	23	356	59
Baltimore	39	DMP	2= .06	0	33= .94	0	35= .90	4= .10
	6999	DAWN	420	0	6579	0	6299	700
Boston	26	DMP	0	0	25= 1.	0	25= .96	1= .04
	2861	DAWN	0	0	2861	0	2751	110
Chicago	29	DMP	6= .28	1= .05	14= .67	0	21= .72	8= .28
	9629	DAWN	2696	481	6452	0	6933	2696
Dallas	35	DMP	1= .03	0	0	29=.97	30=.86	5= .14
	428	DAWN	14	0	0	414	367	61
Denver	27	DMP	0	0	0	22= 1.	22= .81	5= .19
	629	DAWN	0	0	0	629	513	116
Detroit	30	DMP	3= .10	4= .15	20= .74	0	27= .90	3= .10
	2653	DAWN	295	393	1965	0	2388	265
Los Angeles	26	DMP	0	0	0	19= 1.	19= .73	7= .27
	2923	DAWN	0	0	0	2923	2136	787
Miami	29	DMP	0	0	18= .78	5= .22	23= .79	8= .21
	917	DAWN	0	0	718	199	727	190
Newark	34	DMP	1= .03	0	19= .97	0	30= .88	4= .12
	4733	DAWN	158	0	4575	0	4176	557
New Orleans	18	DMP	0	0	14 = 1.	0	14 = .78	4 = .22
	649	DAWN	0	0	649	0	506	143
New York	51	DMP	0	0	49 = 1.	0	49 = .96	2 = .04
	9202	DAWN	0	0	9202	0	8841	361
Philadelphia	39	DMP	0	1= .03	33= .97	0	34= .87	5= .13
	4087	DAWN	0	123	3964	0	3556	531
Phoenix	40	DMP	0	0	1= .03	38= .97	39= .98	1= .02
	839	DAWN	0	0	22	817	818	21
San Diego	31	DMP	0	0	0	30 = 1.	30 = .98	1 = .02
	1063	DAWN	0	0	0	1063	1042	21
San Francisco	37	DMP	0	0	0	36 = 1.	36 = .97	1 = .03
	3050	DAWN	0	0	0	3050	2968	82
Seattle	36	DMP	0	0	0	33= 1.	33= .92	3= .08
	2470	DAWN	0	0	0	2470	2264	206

[17] Totals: Total number of DMP heroin purchases (1st Row) / Total ER heroin mentions (2nd Row).
[18] ID'D: Number and percent of DMP samples classified by source area / Percentage of DAWN ER heroin mentions.
[19] UC: Number and percent of DMP Unclassified Samples / Percentage of DAWN ER heroin mentions.
[20] DMP Data: Number of Heroin Purchases / Percent of Classified DMP samples
[21] DAWN Data: Total Heroin ER mentions x DMP Source Area percentage.

City	Totals	Data Source	SEA	SWA	SA	MX	ID'D	UC
St. Louis	36	DMP	0	0	0	33= 1.	33= .92	3= .08
	851	DAWN	0	0	0	851	780	71
Washington DC	27	DMP	4= .20	2= .08	20= .77	0	26= .96	1= .04
	1771	DAWN	272	136	1362	0	1705	66
TOTAL	611[22]	DMP	26	9	263	246	544	67
	56169[23]	DAWN	4098	1131	38500	12440	49140	7029
PERCENT		DAWN ER / DMP	**7%**	**2%**	**69%**	**22%**	87%	13%

[22] DMP figure represents Total DMP samples (703) minus non-DAWN cities (92). DMP cities without a corresponding DAWN data included El Paso (6 / 6 MX heroin), Houston (39 / 35 MX), Orlando (18 / 17 SA), and San Juan (29 / 25 SA). Source: DEA Domestic Monitor Program, February 2002.

[23] DAWN figure for ER heroin mentions derived from *DAWN Preliminary Estimates January-June 2001 with Revised Estimates 1994-2000*, Table 3.8, p. T-97.

Table 2 – 15 DAWN ER/DMP Heroin User Concept Model: 2000

A Comparison of DAWN ER Heroin Mentions and DMP Retail Heroin Purchases
(User Numbers based on DMP Source Area Percentages)

City	Totals[24]	Data Source	Heroin Source Area					
			SEA	SWA	SA	MX	ID'D[25]	UC[26]
Atlanta	29	DMP[27]	1= .04	5= .19	20= .77	0= 0	26= .90	3= .10
	485	DAWN[28]	19	92	374	0	437	48
Baltimore	32	DMP	1= .03	1= .03	27= .94	0	29= .91	3= .09
	5,405	DAWN	162	162	5,081	0	4,919	486
Boston	30	DMP	0	0	29= 1.	0	29= .97	1= .03
	3,867	DAWN	0	0	3,867	0	3,751	116
Chicago	34	DMP	1= .04	5= .17	22= .79	0	28= .82	6= .18
	12,454	DAWN	498	2,117	9,839	0	10,212	2,242
Dallas	25	DMP	0	0	0	23= 1.	23= .92	2= .08
	478	DAWN	0	0	0	478	440	38
Denver	37	DMP	0	0	0	36= 1.	36= .97	1= .03
	666	DAWN	0	0	0	666	646	20
Detroit	34	DMP	1= .04	5= .18	22= .78	0	28= .82	6= .18
	3,328	DAWN	133	599	2,596	0	2,729	599
Los Angeles	34	DMP	0	0	1= .03	33= .97	34= 1.	0
	3,177	DAWN	0	0	95	3,082	3,177	0
Miami	30	DMP	0	1= .04	24= .96	0	25= .83	5= .17
	1,452	DAWN	0	58	1,394	0	1,205	247
Newark	39	DMP	0	1= .03	34= .97	0	35= .90	4= .10
	4,399	DAWN	0	132	4,267	0	3,959	440
New Orleans	33	DMP	0	0	23= .96	1= .04	24= .73	9= .27
	982	DAWN	0	0	943	39	717	265
New York	46	DMP	0	3= .07	39= .93	0	42= .91	4= .09
	11,009	DAWN	0	771	10,238	0	10,018	991
Philadelphia	40	DMP	0	0	39= 1.	0	39= .98	1= .02
	4,661	DAWN	0	0	4,661	0	4,568	93
Phoenix	27	DMP	0	0	0	26= 1.	26= .96	1= .04
	841	DAWN	0	0	0	841	807	34
San Diego	41	DMP	0	0	0	41= 1.	41= 1.	0
	1,031	DAWN	0	0	0	1,031	1,031	0
San Francisco	35	DMP	0	0	0	34= 1.	34= .97	1= .03
	2,756	DAWN	0	0	0	2,756	2,673	83
Seattle	29	DMP	0	0	0	28= 1.	28= .97	1= .03
	2,490	DAWN	0	0	0	2,490	2.415	75
St. Louis	29	DMP	0	0	0	28 = 1.	28 = .97	1= .03
	1,084	DAWN	0	0	0	1,084	1,051	33

[24] Totals: Total number of DMP heroin purchases (1st Row) / Total ER heroin mentions (2nd Row).
[25] ID'D: Number and percent of DMP samples classified by source area / Percentage of DAWN ER heroin mentions.
[26] UC: Number and percent of DMP Unclassified Samples / Percentage of DAWN ER heroin mentions.
[27] DMP Data: Number of Heroin Purchases / Percent of Classified DMP samples
[28] DAWN Data: Total Heroin ER mentions x DMP Source Area percentage.

City	Totals	Data Source	SEA	SWA	SA	MX	ID'D	UC
Washington DC	27	DMP	1=.04	5=.22	16= .70	1= .04	23= .85	4= .15
	1,946	DAWN	78	428	1,362	78	1,654	292
TOTAL	631[29]	DMP						
	62,511[30]	DAWN	890	4,359	44,717	12,545	56,498	6,013
PERCENT		DAWN ER / DMP	**1%**	**7%**	**72%**	**20%**	90%	10%

[29] DMP figure represents Total DMP Samples (749) minus non-DAWN cities (118). DMP cities without corresponding DAWN data included El Paso (11 / 9 MX heroin), Houston (34 / 34 MX), Orlando (33 / 21 SA), and San Juan (38 / 38 SA). Source: DEA Domestic Monitor Program, February 2002.

[30] DAWN figure for ER heroin mentions derived from *DAWN Preliminary Estimates January-June 2001 with Revised Estimates 1994-2000*, Table 3.8, p. T-97.

Table 2 - 16 Drug Abuse Warning Network (DAWN)

A Comparison of Heroin-related Data by Region
Medical Examiner/Deaths (ME) / Emergency Room Mentions (ER)
(With DMP Primary Heroin Source Area Data)

EASTERN U.S. (region east of the Mississippi River)			**WESTERN U.S. (region west of the Mississippi River)**		
City (Primary Heroin)	**ME**	**ER**	**City (Primary Heroin)**	**ME**	**ER**
Atlanta (SEA/SA)	45	415	Casper, WY	1	--
Baltimore (SA)	451	6,999	Dallas (MX)	80	428
Birmingham, AL	7	--	Denver (MX)	102	629
Boston (SA)	194	2,861	Fargo, ND	--	--
Buffalo	37	--	Kansas City, MO/KS	21	--
Chicago (SA)	457	9,629	Las Vegas	97	--
Cleveland	37	--	Los Angeles (MX)	644	2923
Detroit (SA)	235	2,653	Milwaukee	1	--
Indianapolis	--	--	Minneapolis	33	--
Jackson, MS	1	--	Oklahoma City, OK	25	--
Louisville, KY	12	--	Omaha, NE	2	--
Miami (SA)	40	917	Phoenix (MX)	183	839
Nashua, NH	7	--	Portland, OR	142	--
New Orleans (SA)	83	649	St. Louis (MX)	62	851
New York (SA)	434	9,202	Salt Lake City	92	--
Newark (SA)	147	4,733	San Antonio	77	--
Norfolk, VA	23	--	San Diego (MX)	143	1063
Philadelphia (SA)	454	4,087	San Francisco (MX)	193	3050
Washington, DC (SA)	103	1,771	Seattle (MX)	140	2470
Wilmington, DE	15	--	Sioux Falls, SD	--	--
Subtotal (ME):	2,782		Subtotal (ME):	2,038	
Percent Deaths: East	**58%**		**Percent Deaths: West**	**42%**	
Subtotal ER		43,916	Subtotal ER:		12,253
Percent ER: East		**78%**	**Percent ER: West**		**22%**
Total heroin-related deaths reported by Medical Examiners:			4,820		
Total heroin-related mentions by DAWN Emergency Rooms:			56,169		

Please Note: The predominant heroin source area is given in brackets for cities that participate in the DEA Domestic Monitor Program [DMP]. The source area was derived from the percentage of retail heroin samples analyzed through the DMP that were classified as to source of origin. The DMP data demonstrate that South American heroin was the predominant type of heroin in urban centers east of the Mississippi River, while Mexican heroin dominated western heroin markets.

Table 2 - 17 2000 Drug Abuse Warning Network (DAWN)

A Comparison of Heroin-related Data by Region
Medical Examiner/Deaths (ME) / Emergency Room Mentions (ER)
(With DMP Source Area Data)

EASTERN U.S. (region east of the Mississippi River)			WESTERN U.S. (region west of the Mississippi River)		
City (Primary Heroin)	**ME**	**ER**	**City (Primary Heroin)**	**ME**	**ER**
Atlanta (SA)	30	485	Dallas (MX)	94	478
Baltimore (SA)	397	5,405	Denver (MX)	66	666
Birmingham, AL	3	--	Kansas City MO/KS	20	--
Boston (SA)	183	3,867	Las Vegas	93	--
Buffalo	30	--	Los Angeles (MX)	473	3,177
Chicago (SA)	499	12,454	Milwaukee	4	--
Cleveland	48	--	Minneapolis/St. Paul	17	--
Detroit (SA)	296	3,328	Oklahoma City	19	--
Long Island, NY	105	--	Omaha	2	--
Louisville	10	--	Phoenix (MX)	181	841
Miami (SA)	86	1,452	Portland, OR	107	--
New Orleans (SA)	57	982	St. Louis (MX)	55	1,084
New York (SA)	607	11,009	Salt Lake City	80	--
Newark (SA)	179	4,399	San Antonio	90	--
Norfolk, VA	24	--	San Diego (MX)	145	1,031
Philadelphia (SA)	461	4,661	San Francisco (MX)	148	2,756
Washington, DC (SA)	84	1,946	Seattle (MX)	118	2,490
Wilmington, DE	21	--			
Subtotal (ME):	3,120		Subtotal (ME):	1,712	
Percent Deaths: East	**65%**		**Percent Deaths: West**	**35%**	
Subtotal ER		49,988	Subtotal ER:		12,523
Percent ER: East		**80%**	**Percent ER: West**		**20%**
Total heroin-related deaths reported by Medical Examiners: 4,832					
Total heroin-related mentions by DAWN Emergency Rooms: 62,511					

Please Note: The predominant heroin source area is given in brackets for cities that participate in the DEA Domestic Monitor Program [DMP]. The source area was derived from the percentage of retail heroin samples analyzed through the DMP that were classified as to source of origin. The DMP data demonstrate that South American heroin was the predominant type of heroin in urban centers east of the Mississippi River, while Mexican heroin dominated western heroin markets.

Table 2 - 18 Heroin Availability Working Group Seizure Rate Estimates

This table compares U.S. Customs Service (USCS) heroin seizure figures—as compiled by the WG—and CNC potential heroin production estimates. Putting these figures side-by-side helps explain further the inconsistency between two of the main components necessary for a supply-based estimate of heroin availability in the United States. For example, it seems unlikely that a single agency USCS would simultaneously seize 1 - 5 percent of the Mexican opium crop and up to 30 - 41 percent of the Colombian crop even if law enforcement priorities were focused in the direction of Colombia. Part of this inconsistency lies in how the data is used: the WG's compilation of the USCS data provides only a rough estimate of the source of the seizures and the CNC estimates are of potential production rather than actual production. Nevertheless, this table does highlight the need for those agencies responsible for publishing statistics on heroin to examine their methodologies closely to make the data more useful for policy makers.

Colombian Heroin
CY 2001:
CY 2001 USCS: 1,513 kilograms (gross weight)
CY 2001 CNC: 5,080 kilograms (export-quality heroin) → Seizure rate: 30 percent
CY 2000 CNC: 3,680 kilograms (export-quality heroin) → Seizure rate: 41 percent

CY 2000:
CY 2000 USCS: 678 kilograms (gross weight)
CY 2000 CNC: 3,680 kilograms (export-quality heroin) → Seizure rate: 18 percent
CY 1999 CNC: 3,900 kilograms (export-quality heroin) → Seizure rate: 17 percent

CY 1999:
CY 1999 USCS: 405 kilograms (gross weight)
CY 1999 CNC: 3,900 kilograms (export-quality heroin) → Seizure rate: 10 percent
CY 1998 CNC: 2,300 kilograms (export-quality heroin) → Seizure rate: 18 percent

Mexican Heroin
CY 2001:
CY 2001 USCS: 275 kilograms (gross weight)
CY 2001 CNC: 14,000 kilograms (export-quality heroin) → Seizure rate: 2 percent
CY 2000 CNC: 6,000 kilograms (export-quality heroin) → Seizure rate: 5 percent

CY 2000:
CY 2000 USCS: 181 kilograms (gross weight)
CY 2000 CNC: 6,000 kilograms (export-quality heroin) → Seizure rate: 3 percent
CY 1999 CNC: 12,000 kilograms (export-quality heroin) → Seizure rate: 1.5 percent

CY 1999:
CY 1999 USCS: 159 kilograms (gross weight)
CY 1999 CNC: 12,000 kilograms (export-quality heroin) → Seizure rate: 1 percent
CY 1998 CNC: 18,000 kilograms (export-quality heroin) → Seizure rate: 0.9 percent

Table 2 - 19 Working Group's Compilation of U.S. Customs Service Seizure Statistics

These tables list the exact figures discussed in the text on page 13, in which the WG compiled USCS seizures by source of conveyance to approximate the proportions of heroin entering the US from each source area.

	Heroin 1999 (Kg)	# USCS Seizures	**Heroin 2000 (Kg)**	# USCS Seizures	**Heroin 2001 (Kg)**	# USCS Seizures
Colombia	405.39	326	677.97	505	1513	586
Mexico	159.01	110	181.45	76	275.01	70
Southeast Asia	10.527	21	30.982	17	66.441	19
Southwest Asia	149.12	234	254.81	120	159.18	105
Canada	3.25	23	0.0409	7	5.7091	12
Other/Unknown	90.891	151	195.45	187	147.21	152
Total	818.2	865	1340.7	912	2166.5	944

Seizure Percentages by Source (Excl. Canada & Other/Unknown)

	1999		**2000**		**2001**	
Colombia	56%		59%		75%	
Mexico	22%		16%		14%	
Southeast Asia	1%		3%		3%	
Southwest Asia	21%		22%		8%	

Chapter 3: Estimate of Methamphetamine Availability in the United States

Methamphetamine Availability Methodology and Resulting Estimate

The purpose of this document is to provide an estimate of methamphetamine available in the United States. The utility of such an estimate will allow policy and decision makers to assess the threat methamphetamine poses to the public, develop strategies to disrupt the marketplace centered around methamphetamine, and determine where and how resources could most effectively be deployed to accomplish this mission. The estimate is based on a methodology derived from data and research products currently available to the federal community.

The methodology used to estimate methamphetamine availability is described herein. Its strengths and weaknesses are described in detail, with recommendations to improve upon the weaknesses in order to refine future iterations of the availability estimate. Hence, some of the data currently available for use in this methodology could withstand scrutiny in an evaluative effort, whereas other data sets could not. This report should be considered a ***work in progress***.

Methamphetamine Availability Estimate

Employing the Combined Dominant Source Methodology (CDSM), which is described in detail later in this document, the estimated amount of uncut methamphetamine[31] available in the United States is between 106.5 – 144.1 Metric Tons[32] (CY 2001).

Combined Dominant Source Methodology

A study of the existing body of data relevant to methamphetamine availability indicated that some basis exists for developing a methodology to estimate the amount of imported pseudoephedrine(PSE)/ephedrine – to both the United States and Canada[33] – that can be potentially diverted, at the pre-wholesale[34] level, for methamphetamine production. Additionally, there is some basis for developing a methodology for estimating the amount of Mexico-produced methamphetamine available in the United States. These two sources: 1) diversion of imported PSE/ephedrine at the pre-wholesale level; and, 2) Mexico-produced methamphetamine, are currently considered to be the two dominant sources of methamphetamine in the United States. The CDSM is a two-part methodology that estimates the amount of uncut methamphetamine available from these sources. This is summarized in the following figures. Other smaller sources of methamphetamine will be discussed at the end of this report.

---

[31] Uncut methamphetamine is defined in this report as methamphetamine at 92% purtiy.

[32] Canada Customs has officially reported that, in CY2001, Canada imported 432.4 metric tons (MT) of pseudoephedrine/ephedrine. Based upon the import dollar value and quantity information provided by Canada, the actual amount imported in CY2001 may fall between approximately 124 and 178 MT. The estimate above is based on these latter values. Using the officially reported Canadian Customs value (432.4 MT), the availability estimate of uncut methamphetamine in the United States would increase to approximately 297 MT.

[33] PSE/ephedrine must be imported into North America because there is no domestic production in Canada, Mexico, or the United States.

[34] Pre-wholesale is defined here as the initial distribution of PSE/ephedrine following its legal importation and excludes data regarding all subsequent wholesale and retail sales/diversion.

Figure 3-1 - CDSM - Part One

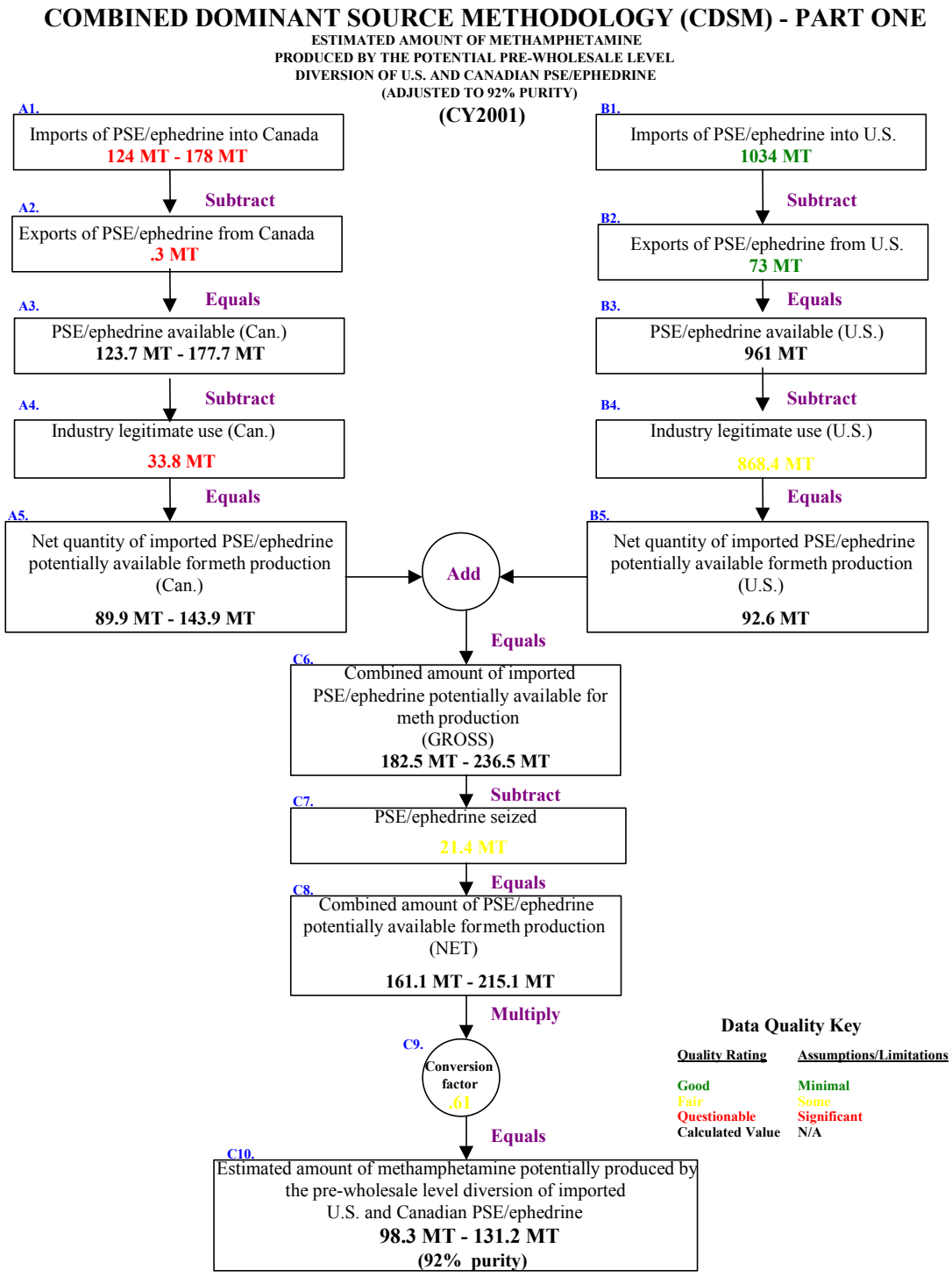


Figure 3-2 - CDSM - Part Two

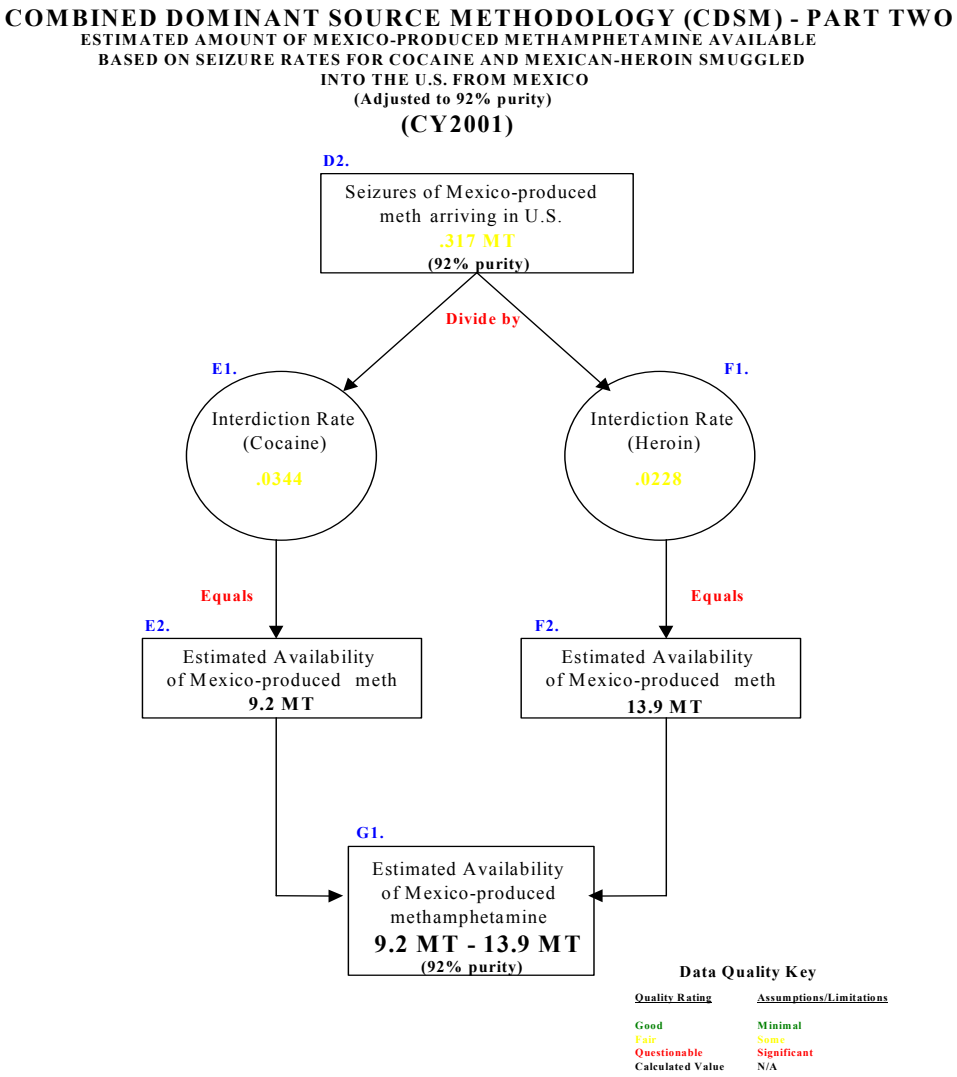
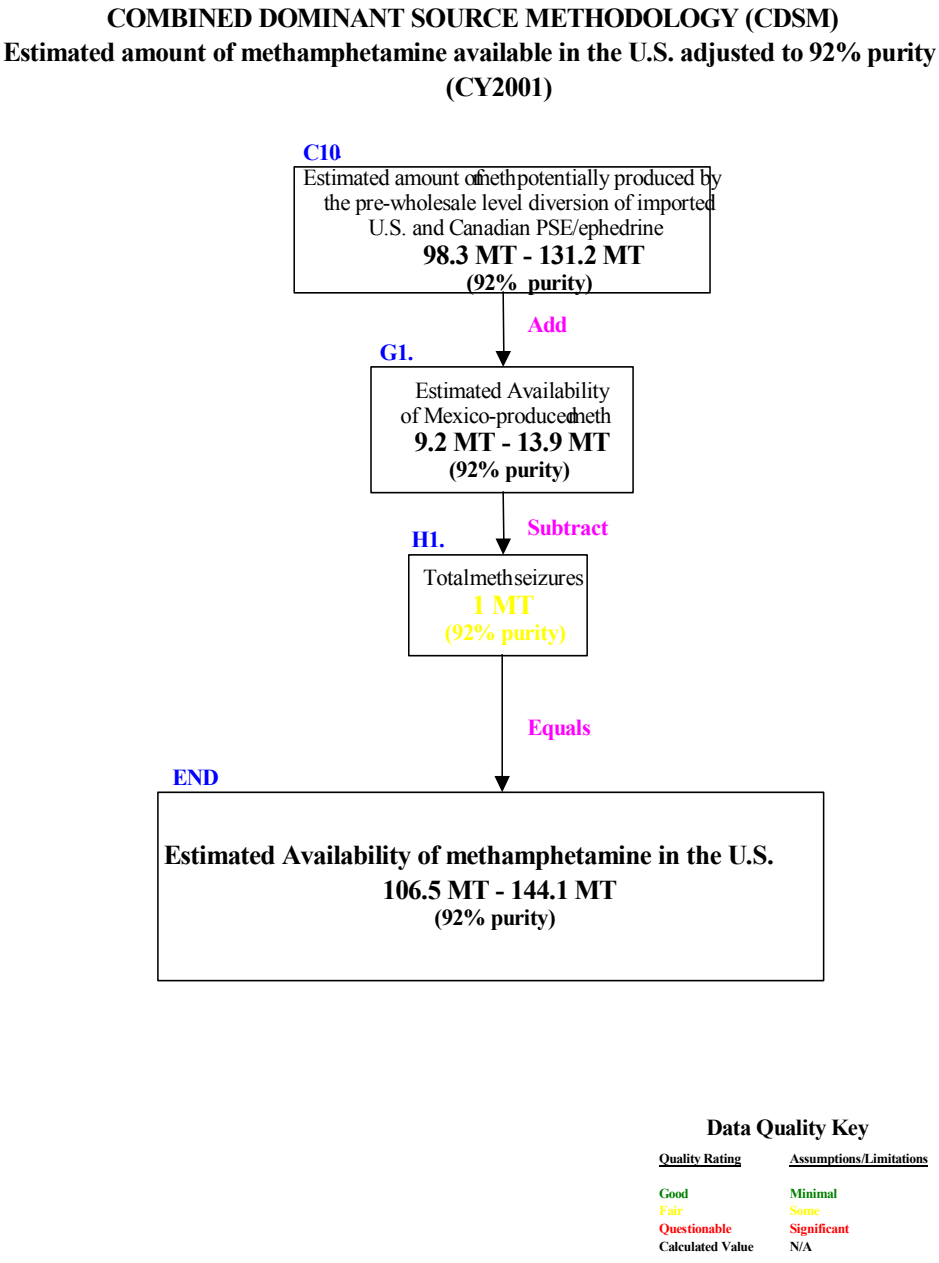


Figure 3-3 - Estimated Amount of Methamphetamine available in the U.S. adjusted to 92% purity (CY2001)



Background

The present methamphetamine market in the United States is dominated by Mexican drug trafficking organizations, who either smuggle large quantities of methamphetamine into the United States across the Southwest border, or produce bulk amounts of the drug at "super labs"[35] located in the western United States, primarily in California. The "super labs" are capable of mass production of methamphetamine due to the unlimited flow of pseudoephedrine[36], the primary and most sought after methamphetamine precursor. Estimating the availability of methamphetamine in the United States encounters several problems: 1) methamphetamine can virtually be manufactured any place in the world, leaving no chemical signature indicating a geographic region as to where the drug was manufactured; 2) there are literally thousands of Small Toxic Labs (STLs)[37] operating throughout the United States; and, 3) although insignificant, methamphetamine is imported from countries other than Mexico (e.g., "yaba"[38] smuggled from Southeast Asia).

CDSM – Part One

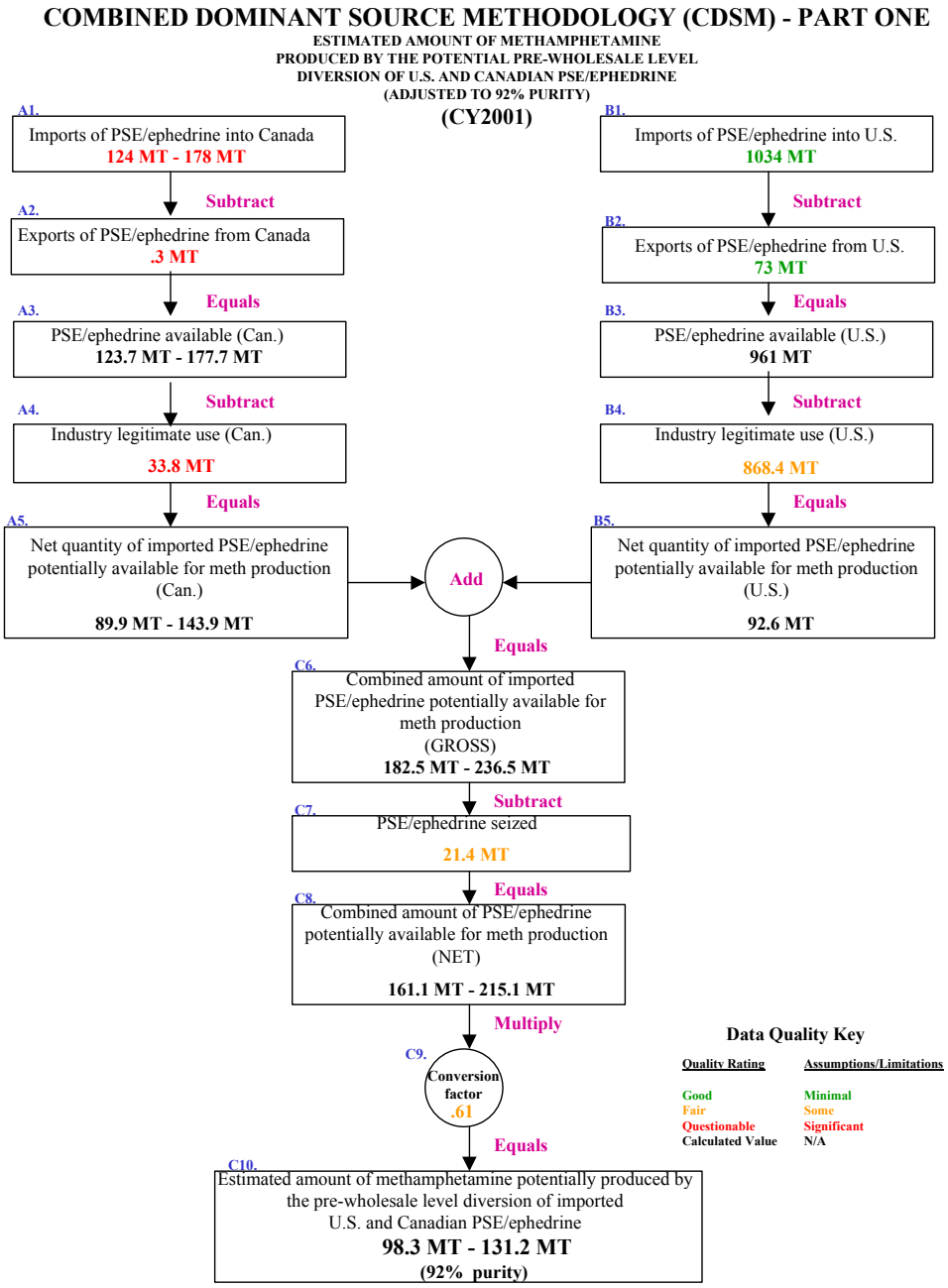
Objective:

To produce an estimate of the amount of imported PSE/ephedrine – to both the United States and Canada – that can be potentiall***y*** diverted, at the pre-wholesale level, for methamphetamine production.

Method:

[35] "Super labs" are clandestine laboratories with the capability of producing 10 pounds or more of methamphetamine during a single production cycle.
[36] Canada is the predominant source of PSE in domestic "super labs".
[37] Small Toxic Labs (STLs) are clandestine labs that typically produce a few ounces or less and production is primarily for personal or localized use.
[38] "Yaba" is a commonly used term for Southeast Asian methamphetamine tablets.

Figure 3-4 - CDSM - Part One



See Section 3-A (Terms) for data sources and caveats. All values shown below are for CY2001 and are reported in metric tons (MT).

Step 1: The net range of imported PSE and ephedrine available in Canada (A3) is calculated by subtracting Canadian PSE/ephedrine exports (A2) from the range of Canadian PSE/ephedrine imports (A1). [A3 = A1 –A2]

Low Value: 123.7 = 124 - .3 **High Value: 177.7 = 178 - .3**

Step 2: The net range of Canadian imported PSE/ephedrine potentially available for methamphetamine production (A5) is calculated by subtracting industry legitimate[39] use of PSE/ephedrine (A4) from the net range of imported PSE and ephedrine available in Canada (A3). [A5 = A3 – A4]
Low Value: 89.9 = 123.7 – 33.8 High Value: 143.9 = 177.7 – 33.8

Step 3: The net quantity of imported PSE and ephedrine available in the United States (B3) is calculated by subtracting U.S. PSE/ephedrine exports (B2) from U.S. PSE/ephedrine imports (B1). [B3 = B1 – B2]
961 = 1034 –73

Step 4: The net quantity of U.S. imported PSE/ephedrine potentially available for methamphetamine production (B5) is calculated by subtracting industry legitimate use of PSE/ephedrine (B4) from the net quantity of imported PSE and ephedrine available in the United States (B3). [B5 = B3 – B4]
92.6 = 961 – 868.4

Step 5: The combined gross range of imported U.S. and Canadian PSE/ephedrine potentially available for methamphetamine production (C6) is calculated by adding the net quantity of U.S. imported PSE/ephedrine potentially available for methamphetamine production (B5) to the net range of Canadian imported PSE/ephedrine potentially available for methamphetamine production (A5). [C6 = A5 + B5]
Low Value: 182.5 = 92.6 + 89.9 High Value: 236.5 = 92.6 + 143.9

Step 6: The combined net range of imported U.S. and Canadian PSE/ephedrine potentially available for methamphetamine production (C8) is calculated by subtracting the amount of PSE/ephedrine seized (C7) from the combined gross range of imported U.S. and Canadian PSE/ephedrine potentially available for methamphetamine production (C6). [C8 = C6 – C7]
Low Value: 161.1 = 182.5 – 21.4 High Value: 215.1 = 236.5 – 21.4

Step 7: The estimated amount of uncut methamphetamine that can be potentially produced by the pre-wholesale level diversion of imported U.S. and Canadian PSE/ephedrine (C10) is calculated by multiplying the combined net amount of imported U.S. and Canadian PSE/ephedrine potentially available for methamphetamine production (C8) by an acceptable range of PSE/ephedrine-to-methamphetamine conversion factors
(61%[40])(C9). [C10 = C8 x C9]
Low Value: 98.3 = 161.1 x .61 High Value: 131.2 = 215.1 x .61

***Method Assumptions*:**

1. Assumption - The estimated amount of methamphetamine that can be produced by the ***potential pre-wholesale level*** diversion of imported United States and Canadian PSE/ephedrine, minus seizures, is available in the United States. Qualification – Though the United States is, by far, the dominant methamphetamine market in the region, methamphetamine produced from this source is also consumed in Canada and Mexico. Effect – The application of this assumption has the effect of slightly inflating the estimate to reflect a worst-case scenario.

[39] Industry legitimate use is defined here as that quantity of PSE/ephedrine that is utilized by legitimate industry for the purpose of making products that contain PSE/ephedrine.

[40] DEA Southwest Laboratory

2. Assumption – The entire amount of imported PSE/ephedrine that can be potentially diverted for methamphetamine production **is** diverted for methamphetamine production. Qualification – The entire amount of imported PSE/ephedrine that can be potentially diverted for methamphetamine production **is not** diverted for methamphetamine production. It is not possible to determine the amount that is utilized for purposes other than methamphetamine production. Effect - The application of this assumption has the effect of inflating the final estimate to reflect a worst case scenario.

3. Assumption – The entire amount of imported PSE/ephedrine that can be potentially diverted for methamphetamine production during any given calendar year **is** used for production in that year. Therefore, it is assumed that none of the diverted PSE/ephedrine is stockpiled for use in future years. Effect - The application of this assumption has the effect of inflating the final estimate to reflect a worst case scenario.

4. Assumption – The entire amount of imported PSE/ephedrine that can be potentially diverted for methamphetamine production is being diverted to domestic "super labs". Qualification – Potentially, a small amount of this PSE/ephedrine may be diverted to less efficient STLs. Effect – As the methodology is using a PSE/ephedrine to methamphetamine conversion factor applicable to more efficient "super labs", the final estimate may be very slightly inflated by this assumption.

***Method Limitations*:**

1. The CDSM-Part One does not account for PSE/ephedrine that is diverted at wholesale, or retail level for methamphetamine production. PSE/ephedrine that is acquired from retail[41] stores, as well as PSE/ephedrine that is acquired from wholesale distributors, fits into this category. Currently, no viable basis exists for making such an estimate.

2. The CDSM-Part One does not account for PSE/ephedrine that is smuggled or illegally imported into either the United States or Canada from sources excluding these countries. Currently, no viable basis exists for making such an estimate.

CDSM – Part Two

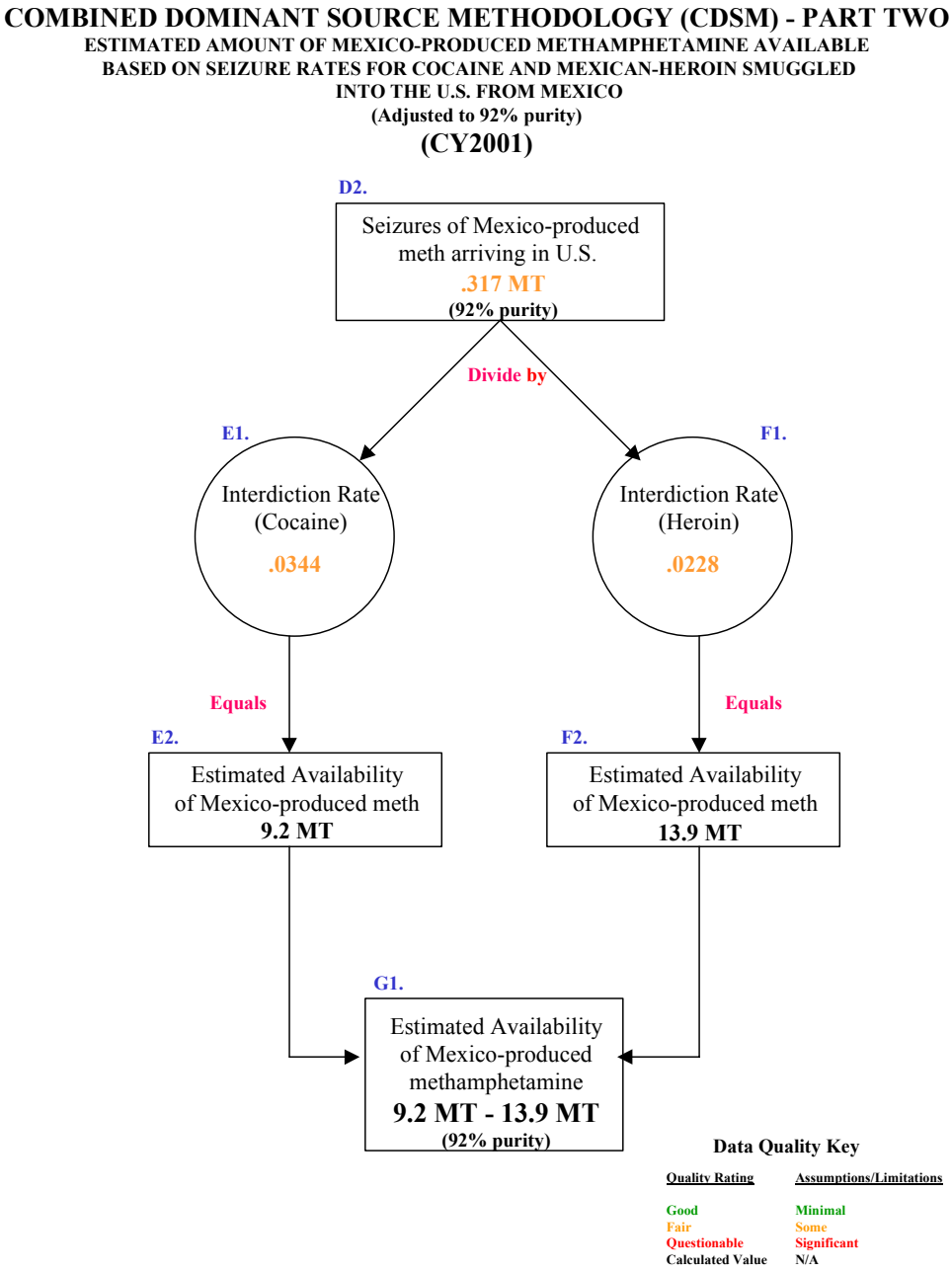
***Objective*:**

To produce an estimate of Mexico-produced methamphetamine available in the United States based on seizure rates for cocaine and Mexican-heroin smuggled into the United States from Mexico.

Method:

[41] Most PSE purchased at the retail level is used in STLs which are not considered a dominant source in the CDSM.

Figure 3-5 - CDSM - Part Two



This model assumes that the percentage of Mexico-produced methamphetamine seized arriving in the United States from the actual Mexico-produced methamphetamine flow is similar to the rate at which cocaine and Mexican heroin are seized arriving from Mexico (this includes cocaine that arrives from

Central America) into the United States.[42] Information from a study conducted by the DEA Special Testing and Research Laboratory (Trends in Methamphetamine Manufacture, June 2000) indicated that Mexico-produced methamphetamine seized at Southwest border (SWB) ports of entry in 1998 averaged 37% purity. In the absence of current information on purity levels of Mexico-produced methamphetamine seized arriving in the United States, 37% purity is considered export quality in this study. For instance, in CY 2001 the 783 kilograms of Mexico-produced methamphetamine at 37% purity were equivalent to 317 kilograms of 92% pure methamphetamine. This model assumes that the 317 kilograms of methamphetamine seized is an estimated percentage of the actual flow of methamphetamine arriving into the United States from Mexico. The following chart shows availability estimates for Mexico-produced methamphetamine for 1998 to 2001 based on seizure rates of cocaine and Mexican-heroin arriving to the United States from Mexico and Central America (amounts in kilograms).

	1998	**1999**	**2000**	**2001**
D1. Seizures of Mexico-produced methamphetamine at export quality arriving in the United States.[43]	289	555	507	783
D2. Seizures of Mexico-produced methamphetamine arriving in the United States adjusted to 92% purity.	116	223	204	317
E1. Interdiction rate of cocaine arriving in U.S. from Mexico/Central American Corridor (%)[44]	4.6	8.0	3.0	3.44
E2. Estimated availability of Mexico-produced methamphetamine based on interdiction rate for cocaine adjusted to 92% purity.[45]	2,521	2,766	6,710	9,215
F1. Interdiction rate of Mexican-heroin arriving in U.S.(%)[13]	1.3	.8	2.3	2.3
F2. Estimated availability of Mexico-produced methamphetamine, adjusted to 92% purity, based on interdiction rate of Mexican-heroin.[14]	8,923	28,961	8,947	13,903

During CY 2000 and CY 2001, the seizure rate for Mexican-heroin only differs by an average of less than 1% from that of cocaine arriving in the United States from Central America and Mexico. Assuming the same degree of operational focus and capability to detect cocaine, Mexican-heroin, and methamphetamine arriving from Mexico and Central America, the estimated availability of 92% pure Mexico-produced methamphetamine was between 9.2 and 13.9 metric tons in CY 2001 (G1).

***Method Assumptions*:**

1. Assumption - In the absence of a chemical signature program for methamphetamine that identifies a general geographic production location, the assumption must be made that methamphetamine arriving from Mexico is also produced in Mexico. This assumption has been strongly supported by information obtained from investigations targeting individuals and groups involved with smuggling methamphetamine from Mexico.

---

[42] Assumptions and limitations involved with estimating cocaine and heroin production can be found in Appendix D.

[43] Information was taken from the EPIC Internal Database of seizures of Mexico-produced methamphetamine that occurred at U.S. ports of entry and at locations between ports of entry along the Southwest border. Seizure totals only include those seizures of methamphetamine known to have arrived from Mexico.

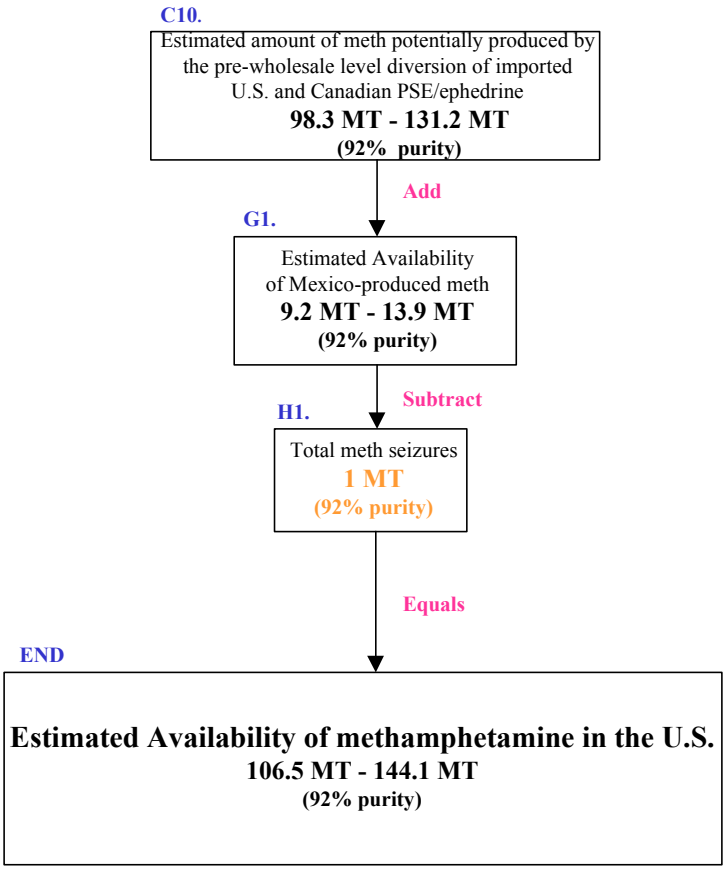
[44] The process used to derive interdiction rates is explained in Appendix D of this report.

[45] This value is calculated using the applicable interdiction rate rounded to four decimal places.

2. Assumption – The cocaine, Mexican-heroin, and methamphetamine smuggled into the United States from Mexico are frequently transported by Mexican poly-drug trafficking organizations that use similar routes and methods to smuggle each of these drugs into the United States. This similarity in smuggling routes and methods leads to the hypothesis that methamphetamine smuggled from Mexico is seized at a rate similar to the rate that cocaine and Mexican-heroin are seized arriving into the United States from Mexico.

Figure 3-6 - CDSM - Estimated Amount of Methamphetamine available to 92% purity

COMBINED DOMINANT SOURCE METHODOLOGY (CDSM)
Estimated amount of methamphetamine available in the U.S. adjusted to 92% purity
(CY2001)



Data Quality Key

Quality Rating	Assumptions/Limitations
Good	Minimal
Fair	Some
Questionable	Significant
Calculated Value	N/A

Per the CDSM- Part One, the estimated amount of 92% pure methamphetamine that can be produced by the potential pre-wholesale level diversion of imported U.S. and Canadian PSE/ephedrine (C10) in CY2001 is 98.3 – 131.2 MT

Per the CDSM – Part Two, the estimated amount of 92% pure Mexico-produced methamphetamine available in the United States in CY2001 based on the interdiction rates of cocaine and heroin (G1) is as follows:

9.2 MT (Based on cocaine interdiction rate)
13.9 MT (Based on heroin interdiction rate)

If the above totals are combined, the estimated amount of 92% pure methamphetamine available in the United States in CY2001 is 107.5 MT – 145.1 MT

The following represents CY2001 seizure totals of methamphetamine adjusted to 92% purity (H1)**(**in kilograms):

Mexico-produced methamphetamine: (Source: EPIC EID)	471.0	
"Super lab" produced methamphetamine: (Source: CLSS)		210.8
Unknown-source methamphetamine: (Source: EID, CLSS, FDSS)		321.0
TOTAL:		1,002.8

The estimated amount of 92% pure methamphetamine available in the U.S. in CY2001, accounting for the above seizure totals, is

CY2001: 106.5 – 144.1 MT

Combined Method Assumptions:

1. Assumption – In order to combine Parts One and Two, the CDSM assumes all PSE/ephedrine available for the production of methamphetamine is used in ***domestic*** "super labs". Qualification – This assumption excludes use of the available, diverted PSE/ephedrine in "super labs" ***outside of the United States.*** There is no basis for making such an estimate. Effect - The application of this assumption may have the effect of inflating the estimate.

2. Assumption - It is assumed that the unknown source methamphetamine seizure totals provided above do not include methamphetamine produced in STLs.

Combined Method Limitation:

1. Information regarding the origin of methamphetamine which is available to be

consumed in the United States is limited to seizure events involving methamphetamine at clandestine labs in the United States and entering the United States at ports of entry (POE's) and between POE's. The EPIC also collects seizure information on methamphetamine produced in Mexico that is seized within approximately 150 miles from the border when the origin of the methamphetamine was known to have been Mexico. Information on the origin of methamphetamine seized away from clandestine labs and outside of 150 miles of the border is not systematically being collected. Seizures other than these inside the United States do not reflect whether the source is Mexico, domestic, or some other area.

Non-Dominant Sources

***Small Toxic Labs*:**

There is no known method by which an accurate production estimate of STL's can be derived. This conclusion is based on the fact that data on the quantity of retail pseudoephedrine that is stolen or "smurfed"[46] from legitimate retailers for use in the manufacture of methamphetamine is not available. Moreover, production capabilities of seized STLs are extremely inaccurate because of the crude nature of the labs. Unlike "super labs," STLs use makeshift equipment and household products to manufacture the drug. These operations tend to be short-term endeavors and are commonly moved or discarded at the end of a production cycle. In short, there is no way to make an accurate production estimate of STLs based upon equipment and chemicals.

The CDSM assumes that the majority of PSE/ephedrine diverted at the pre-wholesale level is destined for methamphetamine production at "super labs". However, it is possible that a small amount of this PSE/ephedrine may be diverted to STLs. Therefore, the CDSM may account for some methamphetamine produced in STLs.

Southeast Asian Methamphetamine

Southeast Asian methamphetamine tablets, also known as "yaba," appeared in parts of California as early as 1997. Seizures of "yaba" increased rapidly from 1,232 tablets in 1997 to 301,697 in 2000. Almost all seizures were sent via parcel, with the majority destined for the native Hmong community in the Sacramento area. Although the rapid increase in seizures signaled that "yaba" may become an increased threat to the United States, seizures in 2001 decreased to 32,280 pills. It is possible that traffickers have resorted to methods other than sending "yaba" via parcel or that users have simply resorted to using locally-produced methamphetamine to avoid law enforcement detection. Additionally, the majority of "yaba" remains in Asia because the market is far from saturated, and in some regions, demand is just beginning to develop.

There is not sufficient evidence that Southeast Asian tablets significantly contributed to the overall availability of methamphetamine; therefore, no estimates of the availability of "yaba" are included in this model.

"Ice" Methamphetamine:

[46] Pseudoephedrine that is purchased at the maximum quantity threshold by several different individuals or from several different retailers

Although some "ice"[47] methamphetamine arrives in Guam and Hawaii from China and the Philippines, the majority comes from Mexican drug trafficking organizations operating in California, the Southwest border, and Mexico. Additionally, the majority of "ice" produced in China remains in Asia because the market is far from saturated, and in some regions, demand is just beginning to develop. Therefore, "ice" methamphetamine from China and the Philippines was not included as a dominant source in this model. Domestic and Mexican-produced "ice" is accounted for in the CDSM since the availability estimate is rendered for powder methamphetamine.

Chemical Diversion

PSE/ephedrine were chosen as the best available measure for the CDSM for the following reasons:

1) PSE/ephedrine are the predominant precursor chemicals used in North American methamphetamine production.

2) PSE/ephedrine must be imported into North America because there is no domestic production in Canada, Mexico, or the United States.

3) Canada is currently the predominant source of PSE/ephedrine used in United States "super labs".

4) Although imperfect, PSE/ephedrine import/export data is available from certain countries.

Seizure information pertaining to chemicals used in the manufacture of methamphetamine, such as iodine, red phosphorus, and freon, were available from United States Customs; however, they were not used for the following reasons:

1) It is impossible to ascertain if the chemicals were being smuggled to produce methamphetamine.

2) It is not possible to ascertain the location of the labs to which the chemicals were destined; therefore, it is also impossible to know if separate chemicals were destined for the same lab to be used in the production of the same quantity of methamphetamine (i.e., if the seizures were mutually exclusive from one another).

3) Conversion rates for such chemicals are not as reliable as those used for pseudoephedrine/ephedrine conversion to methamphetamine.

4) Chemical seizure data is not uniformly collected. (See Table 2-C)

5) There is significant domestic production of such chemicals.

Epilogue - The Future of Methamphetamine

Mexican national "super labs" operating in Mexico and in the Southwest and western U.S. produce the majority of the methamphetamine distributed in the United States. These "super labs" are capable of producing large quantities of methamphetamine due, in part, to the plentiful supply of pseudoephedrine, the primary and most sought after methamphetamine precursor. In recent years, the majority of the pseudoephedrine utilized in "super labs" was diverted from rogue DEA registered

[47] The manufacture of "ice" involves an additional process to remove impurities and change powder methamphetamine to solid form.

manufacturers and distributors within the United States. Operation Mountain Express I and II identified, prosecuted, and closed the businesses of many of these rogue pseudoephedrine distributors, thereby interrupting the flow of pseudoephedrine to the "super labs". This abatement was short-lived, however, as pseudoephedrine trafficking organizations found a new supply for pseudoephedrine – Canada.

Trafficking groups discovered pseudoephedrine is both legal and plentiful in Canada. This discovery led to the smuggling of unprecedented quantities of pseudoephedrine from Canada to the United States saturating the wholesale/retail clandestine laboratory market. Chemical traffickers of Middle Eastern descent currently control the majority of the pseudoephedrine that is diverted to "super labs". This trend has continued, despite the success of the recently concluded Mountain Express III which targeted organizations that supplied ton quantities of Canadian pseudoephedrine to large clandestine methamphetamine operations on the West Coast.

A decrease or total cessation of the smuggling of Canadian pseudoephedrine into the United States would have a significant impact on domestic clandestine methamphetamine production since "super lab" operators rely heavily on the supply of Canadian pseudoephedrine. Although lab operators would eventually find other sources for pseudoephedrine or substitute chemicals for pseudoephedrine, this transition would be slow. Therefore, in a short period of time the market demand for pseudoephedrine would far exceed the supply. Mexican national laboratory operators in the United States may then increase methamphetamine production in Mexico where chemicals could be more easily obtained. The traffickers would then be faced with the problem of smuggling increased volumes of the drug into the United States through the Southwest border.

Although disrupting the flow of Canadian pseudoephedrine would have a significant impact on large labs, it most likely would not decrease the total number of clandestine laboratory seizures in the United States. Rather, clandestine laboratories would probably increase to meet the market demand. Small Toxic Labs (STLs) currently comprise a great majority of the domestic clandestine methamphetamine laboratory seizures, primarily due to the unrestricted availability of retail sale "blister pack" pseudoephedrine[48].

---

[48] Blister pack pseudoephedrine tablets are exempt from retail sale recordkeeping thresholds due to a "safe harbor" provision initially established in the "Methamphetamine Control Act of 1996" (MCA). The MCA established a 24 gram recordkeeping threshold for retail sales of **non-exempt** pseudoephedrine products. The MCA safe harbor provision exempted retail sale blister packs from the 24 gram threshold. Pseudoephedrine blister pack products are regularly found at small toxic lab (STL) sites and are becoming increasingly popular among STL operators.

Under the MCA, the sale of non-exempt pseudoephedrine products above the threshold quantity was considered a regulated transaction. Under 21 USC 830(a)(2), the regulated person must maintain a record of each regulated transaction for a period of two (2) years after the transaction. This record must include the date, identity of each party to the transaction, a statement of the quantity and the form of the listed chemical.

The "Methamphetamine Anti-Proliferation Act of 2000"(MAPA) reduced the retail sale recordkeeping threshold quantity of non-exempt pseudoephedrine products to 9 grams and limited package sizes to not more than three (3) grams. The safe harbor exemption remained on retail sale blister packs.

The safe harbor provision is, in essence, allowing retail outlets to sell blister pack pseudoephedrine products without triggering a threshold recordkeeping requirement. For example, if the safe harbor provision is removed and a 9 gram threshold is established, the STL operator can still purchase approximately fifteen (15) blister packs of 24 count pseudoephedrine 30 mg tablets without triggering the recordkeeping requirement (as compared to an unlimited amount under the safe harbor provision). Ordinarily, the STL operator would utilize several individuals to purchase smaller quantities of blister packs on his behalf to avoid suspicion of criminal activity (a technique commonly referred to as "smurfing").

Since there are no effective regulatory restrictions to prevent the purchase of large quantities of blister pack pseudoephedrine, STLs will continue to proliferate throughout the United States to meet consumer demand. The raw materials utilized by STL operators are readily available as household products in retail stores. Restricting the supply of retail sale pseudoephedrine is one way to help prevent STL operators from manufacturing methamphetamine.

Regulatory restrictions of all retail sale pseudoephedrine products could cause a dramatic decrease in the number of STLs and the amount of STL-produced methamphetamine. However, this situation could also provide an opportunity for new trafficking groups to enter the methamphetamine market. Several countries in the Far East have traditionally produced large quantities of methamphetamine for user populations in their respective countries and for export to neighboring countries. Asian trafficking groups with manufacturing operations located in the Far East could establish a foothold in the United States market and potentially supply large quantities of methamphetamine.

Recommendations

1. ***Mandatory, comprehensive, nationwide drug seizure reporting system.***

Situation: Currently there is no mandatory, comprehensive, nationwide drug seizure reporting system. Therefore, some state and local seizures are not accounted for in seizure totals. As such, seizure statistics do not necessarily provide an accurate overview of methamphetamine trafficking or seizure trends.

Recommendation: Initiate a multi-agency "database requirements working group" determine the objectives, feasibility, requirements and cost of such a system. This working group should be composed of database experts, statisticians, and quantitative researchers.

2. ***Reporting thresholds.***

Situation: Currently, only seizures by INS, DEA, FBI, USCS, or USCG, of 250 grams or more of methamphetamine, which occur in the United States or on the high-seas, are logged into the Federal Drug Identification Number (FDIN) System.

Recommendations:

A. Lower the reporting threshold. This should be an objective of the multi-agency "database requirements working group".

B. Expand FDIN reporting to include all federal, state, and local law enforcement entities making methamphetamine or methamphetamine-related chemical/precursor seizures in the United States. Change the name of the system to "***National*** Drug Identification Number (NDIN) System."

3. ***Canadian pseudoephedrine/ephedrine import/export values and industry legitimate use.***

Situation: Currently, there is no consolidated reporting system in Canada for capturing pseudoephedrine/ephedrine imports, exports, and industry legitimate use. The Canadians are tentatively scheduled to institute Precursor Control Regulations in January 2003. The institution of these regulations will require licensing and permit requirements for the import/export of pseudoephedrine/ephedrine.

Recommendation: Officially provide the Government of Canada a list of reporting requirements that would improve the reliability of methamphetamine production estimates (i.e., the quantity of PSE/ephedrine that is imported to Canada, exported from Canada, and legitimately consumed/processed at the industrial level).

4. ***Legitimate use estimates for PSE/ephedrine***

Situation: Currently, "industry legitimate use" is defined as the quantity of PSE/ephedrine that is utilized by legitimate industry for the purpose of making products that contain PSE/ephedrine. Actual legitimate use is likely to be less than industry legitimate use since an unknown amount is diverted at the wholesale and retail level in order to produce methamphetamine.

Recommendation: Initiate a nationwide data collection effort to estimate "legitimate consumer use" of PSE/ephedrine. This should be accomplished through the use of statisticians and quantitative researchers. This information may provide the basis for estimating production from STLs.

Appendix 3-A – Terms for CDSM Part One

All terms are for CY2001 and are reported in metric tons.

A1 – Canadian PSE/ephedrine imports: 124 – 178*
Source: Range generated by calculating the average cost per kilogram of Canadian PSE/ephedrine during different time intervals. Kilogram and dollar values were provided by Canada Customs. (See Section 3-B – Calculations)
*Caveat: Canada Customs officially reported that, in CY2001, Canada imported 432.4 metric tons of PSE/ephedrine. Based upon the import dollar value and quantity information provided by Canada, DEA believes that the actual amount imported in CY2001 may fall between approximately 124 and 178 MT.

A2 – Canadian PSE/ephedrine exports: .3*
Source: Canadian Customs
*Caveat: The official import value derived from import dollar-to-weight ratio. (See Section 3-B – Calculations)

A3 – Net quantity of imported PSE/ephedrine available in Canada: 123.7 – 177.7
Source: Calculated term [A1 – A2]

A4 – Canadian industry legitimate use of PSE/ephedrine: 33.8
Caveat: No information available from Canada. Value is derived using the average amount of PSE/ephedrine imported into Canada during the 1996-1997 time period. In 1998, PSE/ephedrine imports increased dramatically from a relative plateau of approximately 30 MT to over 100 MT. This increase occurred at roughly the same time that Canada was identified as a major source of PSE for methamphetamine production. It is assumed that the average import values during 1996-1997 are a viable approximation of Canadian industry legitimate use. (See Section 3-B – Calculations)

A5 – Net quantity of Canadian imported PSE/ephedrine potentially available for methamphetamine production: 89.9 – 143.9
Source: Calculated term [A3 – A4]

B1 – U.S. PSE/ephedrine imports: 1034
Source: Foreign Trade Division, U.S Dept. of Commerce
Description: Information based on import declarations.

B2 – U.S. PSE/ephedrine exports: 73
Source: Foreign Trade Division, U.S. Dept. of Commerce
Description: Information based on export declarations.

B3 – Net quantity of imported PSE/ephedrine available in the U.S.: 961
Source: Calculated term [B1 – B2]

B4 - U.S. industry legitimate use of PSE/ephedrine: 868.4*
Sources: CHPA (Consumer Health Care Products Association), Novus, Bayer and Whitehall-Robins.
Description: Non-governmental sources. CHPA claims to account for 90% of industry consumption of PSE. Novus, Bayer and Whitehall-Robins account for the overwhelming majority of ephedrine imported for legitimate usage.

*Caveat: CHPA Value is adjusted to reflect 100% of wholesale market. CY2000 Primatene ephedrine use estimates were also used for CY2001. (See Section 3-B - Calculations)

B5 – Net quantity of U.S. imported PSE/ephedrine potentially available for methamphetamine production: 92.6

Source: Calculated term [B3 – B4]

C6 – Combined gross amount of imported U.S. and Canadian PSE/ephedrine potentially available for methamphetamine production: 182.5 – 236.5

Source: Calculated term [A5 + B5]

C7 – Amount of PSE/ephedrine seized: 21.4

Source: El Paso Intelligence Center (EPIC) - EPIC Internal Database (EID)

Limitations: **(**See Section 3-C – Data Source Limitations).

C8 – Combined net amount of imported U.S. and Canadian PSE/ephedrine potentially available for methamphetamine production: 161.1 – 215.1

Source: Calculated term [C6 – C7]

C9 – PSE/ephedrine-to-methamphetamine conversion factor: .61

Source: DEA Southwest Laboratory* (See Section 3-B – Calculations)

C10 – Estimated amount of 92% pure methamphetamine that can be produced by the potential wholesale level diversion of imported U.S. and Canadian PSE/ephedrine: 98.3 – 131.2

Source: Calculated term [C8 x C9]

Appendix 3-B – Calculations

(Calculations demonstrate 2001 values)

Term A1 – Canadian PSE/ephedrine imports

Low Value: This value is calculated by dividing the CY2001 import value of PSE/ephedrine by the average cost per kilogram as reported by Canada Customs during the period from 1996-1997. This time period is being used as it reflects values prior to the significant increase in PSE/ephedrine imports that occurred in 1998.

CY2001 Canadian PSE/ephedrine import value in Canadian dollars: 13,145,671
1996-1997 average PSE/ephedrine cost/kilogram in Canadian dollars: 106

CY2001 Canadian PSE/ephedrine imports = 13,145,671 / 106 = 124 MT

High Value: This value is calculated by dividing the CY2001 import value of PSE/ephedrine by the average cost per kilogram as reported by Canada Customs during the period from 1996-1999. This time period is being used as it reflects values prior to the dramatic increase in PSE/ephedrine imports that occurred in 2001.

CY2001 Canadian PSE/ephedrine import value in Canadian dollars: 13,145,671
1996-2001 average PSE/ephedrine cost/kilogram in Canadian dollars: 73.9

CY2001 Canadian PSE/ephedrine imports = 13,145,671 / 73.9 = 178 MT

Term A2 – Canadian PSE/ephedrine exports

The CY2001 Canadian PSE/ephedrine export value is only rendered in dollars, whereas the CY2001 Canadian PSE/ephedrine import value is rendered in both dollars and weight. The CDSM converts the export dollar value to metric tons using the import dollar to weight ratio.

CY2001 Canadian PSE/ephedrine export value in dollars: 7,916
CY2001 Canadian PSE/ephedrine import value in dollars: 13,145,671
CY2001 Canadian PSE/ephedrine import volume in kilograms: 432,430.5

Import weight to dollar ratio: 432,430.5/13,145,671 = .033 dollars/kilograms.

CY2001 Canadian PSE/ephedrine export volume in kilograms: 7,916 X .033 = 260.4 kgs = .3 MT

Term A4 – Canadian industry legitimate use of PSE/ephedrine.

No information concerning this value is available from Canada. Value is derived using the average amount of PSE/ephedrine imported into Canada during the 1996-1997 time period. In 1998, PSE/ephedrine imports increased dramatically from a relative plateau of approximately 30 MT to over 100 MT. This increase occurred at roughly the same time that Canada was identified as a major source of PSE for methamphetamine production. It is assumed that the average import values during 1996-1997 are a viable approximation of Canadian industry legitimate use.

CY1996 Canadian PSE/ephedrine imports: 32,914 kg
CY1997 Canadian PSE/ephedrine imports: 34,718 kg

Average of CY1996 and CY1997 Canadian PSE/ephedrine imports: 33,816 kg

Term B4 – U.S. industry legitimate use of PSE/ephedrine

The CDSM value is calculated by adding CHPA (adjusted to reflect 100% of U.S. PSE industry legitimate use), Novus, Bayer (Bronkaid), and Whitehall-Robins (Primatene) industry legitimate use values for PSE and ephedrine. It is believed that these combined sources account for the total U.S. industry legitimate use for PSE and ephedrine.

A**.** *Adjustment of CHPA to reflect 100% of U.S. PSE industry legitimate use*

CHPA reported U.S. PSE industry legitimate use: 511 MT (90% of market)

Determination of 100% PSE industry legitimate use market:
.9 (M) = 511; M = 511/.9; M = 568 MT

B**.** *Novus reported legitimate use of ephedrine* = 299 MT

C**.** *Conversion of processed tablets to ephedrine MT*

Bronkaid (Bayer): 27.4 million tablets X 25 milligrams(mg)/tabs = **.**645 MT

Primatene (Whitehall-Robins): 58 million tablets X 12.5 mg/tabs = **.**725 MT

Total: Bronkaid + Primatene = 1.37 MT

D. Total U.S. industry legitimate use of PSE/ephedrine:

100% of PSE industry legitimate use: 568 MT
Novus reported legitimate use of ephedrine: 299 MT
Primatene and Bronkaid total: 1.37 MT
Total: 868.4 MT

Term C7 - Amount of PSE/ephedrine seized

A. *Conversion of seized ephedrine dosage units (DU) to MT:*

1,242,542 DU x 25mg/DU = .03 MT

B**.** *Conversion of seized PSE dosage units (DU) to MT:*

157,211,668 DU x 60mg/DU = 9.4 MT

C**.** *EPIC reported PSE/ephedrine seizures in MT: 11.7 MT*

D. Total amount of PSE/ephedrine seized: 21.4

Term C9 – PSE/ephedrine-to-methamphetamine conversion factor

Per the DEA Southwest Laboratory: 8,640 tablets containing 60 mg of PSE can produce .7 lb of uncut methamphetamine at 92% purity.

8,640 x 60 mg = .5184 kg of PSE

.7 lb = .3175 kg

.5184 kg of PSE = .3175 kg methamphetamine at 92% purity

conversion factor = .3175 / .5184 = .612

Appendix 3-C – Data Source Limitations

- **EPIC Internal Database Seizure Information**

  The EPIC Internal Database (EID) contains methamphetamine and pseudoephedrine seizures, which meet Federal Drug Identification Number (FDIN) criteria (250 grams for methamphetamine and 1,000 grams or 5,000 dosage units for pseudoephedrine), made in the United States by federal agencies and by state and local law enforcement personnel who seize the drug as part of DEA-sponsored Operations PIPELINE, JETWAY, or CONVOY. (There is no minimum threshold for reporting ephedrine seizures). No minimum thresholds were used in the retrieval of seizure data from the EID. If the event was reported to EPIC and placed in EID, it should be included in these statistics. EPIC usually imposes the FDIN criteria when it produces seizure statistics because reporting seizures below FDIN thresholds cannot be checked against FDIN logs. Additionally, these seizures are less significant events.

  Seizure event descriptions recorded in the EID are coded to identify those events that involve methamphetamine arriving from outside the United States, and also seizures within the Southwest border area (up to approximately 150 miles from Mexico) where the drugs are believed to have crossed by land transport into the United States from Mexico. (EPIC analysts contact field agents on each seizure of methamphetamine that occurs away from SWB ports of entry, but within 150 miles from the Mexico border to determine the drug's origin). Seizure events recorded in the EID, which occurred outside the "Arrival Zone" (i.e., as defined in the previous sentence), do not differentiate between foreign-produced methamphetamine and domestic-produced methamphetamine.

  Seizure event data recorded in EID does not include drug purity information.

  EPIC's seizures of methamphetamine include an unknown quantity (thought to be small) of amphetamine, because data captured in EID are based on initial reporting from some law enforcement personnel who use drug testing equipment that cannot differentiate between methamphetamine and amphetamine. Therefore, while seizure events descriptions are included in the EID for both methamphetamine and amphetamine, EPIC usually combines methamphetamine and amphetamine seizure statistics for its products, rather than giving separate totals for each.

  Seizure events are voluntarily reported to EPIC by federal, state, and local law enforcement agencies. Due to the lack of any mandatory, comprehensive, nationwide drug seizure reporting system, seizure statistics may not necessarily provide an accurate overview of methamphetamine trafficking or seizure trends.

  Beginning January 1, 2001, all methamphetamine and precursor chemical seizures that met FDIN thresholds have been entered into EID. Prior to January 1, 2001, only seizures of methamphetamine and precursor chemicals that met certain EPIC program criteria (i.e., Operation JETWAY, PIPELINE, Southwest Border, etc.) were entered into EID.

  EPIC infrequently receives information regarding the tablet strength (i.e. 30mg, 60mg, 100mg) of pseudoephedrine or ephedrine seized.

  Chemicals such as freon, iodine, and red phosphorous do not require FDINs. Furthermore, essential chemicals that do require FDINs have high thresholds; therefore, certain chemical seizures are often not reported as they are below the threshold.

- **Clandestine Laboratory Seizure System (CLSS)**

  The Attorney General mandated that the CLSS, which is housed at EPIC, be established in January 1998 to capture data that pertains to clandestine laboratories that are seized in the United States by local, state, and federal law enforcement agencies. A clandestine lab is defined as an illicit operation consisting of a sufficient combination of apparatus and chemicals that either has been or could be used in the manufacture or synthesis of controlled substances. (This means that the seizure of chemicals, residue, or glassware alone does not necessarily constitute a lab).

  Prior to the establishment of the CLSS, DEA information on clandestine lab seizures, dating back to1990 was maintained in a database at DEA Headquarters. This information was transferred to EPIC and entered into the CLSS when the system was established in January 1998. Similarly, lab seizure data maintained at the Western States Information Network since 1989 have been included in the CLSS.

  Clandestine laboratory seizure events are voluntarily reported to EPIC by state and local law enforcement and most federal agencies. DEA is the only federal agency that is required to report clan lab seizures to EPIC. Due to the lack of any mandatory, comprehensive, nationwide clandestine lab reporting system, clan lab seizure statistics may not necessarily provide an accurate overview of methamphetamine production in the United States.

Appendix 3-D – Estimating Interdiction Rates

Estimating U.S. Import Interdiction Rates for Mexican-Heroin

The Heroin Availability Study, submitted by the Heroin Availability Working Group, indicates that the amount of heroin available for U.S. consumption in calendar year 2001 (CY01) was between approximately 13 and 18 metric tons of pure heroin. This conclusion was based on two heroin consumption studies: the "Estimation of Heroin Availability: 1996-2000" by Abt. Associates under contract with the Office of National Drug Control Policy; and the "Global Heroin Threat Assessment by CNC, July 2000 (which contains the consumption estimate for CY99). Though the most recent estimates for these studies are for CY99 and CY00, the Heroin Availability Working Group believes that CY01 consumption would not significantly change from the CY00 estimate. Therefore, for this study, the CY00 consumption estimate is used also for CY01. The Abt. Associates study provides estimates for the amount of Mexican heroin available to enter the United States for CY96 to CY00.[49] The following chart shows the process for formulating U.S. import seizure rates for Mexico-heroin based on the Abt. Associates study, which provides the CY01 low-end U.S. heroin consumption estimate of approximately 13 metric tons. (Amounts are in kilograms and 100 percent purity.)

	1998	**1999**	**2000 and 2001**
A. U.S. heroin consumption low-end estimate	14,500	14,300	13,300
B. % of U.S. heroin consumption from opium grown in Mexico	28.75	28.33	25.5
C. The low-end estimate of consumption of Mexican heroin.	4,169	4,051	3,392
D. U.S. domestic seizures of Mexican heroin	53.53	50.5	43.11
E. U.S. import seizures of Mexican heroin	70.04	40.07	108.02
F. Mexican heroin available to enter the U.S. (C+D+E)	4,293	4,142	3,543
G. Mexican heroin seizure rate at import into the U.S. (E÷F)	1.63%	.97%	3.05%

The CNC study only provides a high-end U.S. heroin consumption estimate of 18 metric tons for CY99. For the purpose of this study the CY99 estimate is also used as the estimate for CY98, CY00 and CY01. The CNC study does not attempt to calculate the heroin source area in its consumption, therefore the percentage of Mexican heroin at consumption, used in the Abt. Associates study, is applied to the CNC consumption estimate. For instance in CY99, the Abt. Associates study indicated that 28.33% of heroin consumed in the United States was made from opium produced in Mexico, thus, 5.1 metric tons of the 18 metric tons consumed in the United States was Mexican heroin. Seizure totals (domestic and U.S. import) for Mexican heroin, documented in the Abt. Associate study, were added to the Mexican heroin consumption estimate to calculate the amount of Mexican heroin available to enter the United States. The following chart shows the process for formulating U.S. import seizure rates for Mexican heroin based on the CNC study, which provides the CY01 high-end U.S. heroin consumption estimate of 18 metric tons. (Amounts are in kilograms and 100 percent purity.)

[49] "The Estimation of Heroin Availability: 1996-2000, (page 17)" prepared by Abt. Associates for the Office of National Drug Control Policy.

	1998	1999	2000 and 2001
A. U.S. heroin consumption high-end estimate	18,000	18,000	18,000
B. % of U.S. heroin consumption from opium grown in Mexico	28.75	28.33	25.5
C. U.S. consumption of Mexican heroin high-end estimate (A x B)	5, 175	5,099	4,590
D. U.S. domestic seizures of Mexican heroin	53.53	50.5	43.11
E. U.S. import seizures of Mexican heroin	70.04	40.07	108.02
F. Mexican heroin available to enter the U.S. (C+D+E)	5,228.5	5,189.5	4,741.1
G. Mexican heroin seizure rate at import into the U.S. (E÷F)	1.34%	.77%	2.28%

Mexican heroin seized arriving in the United States for CY98 to CY01 ranged from .77% to 3.05% of the estimated Mexican heroin available to enter the United States**.**

Estimating U.S. Import Seizure Rates for Cocaine Arriving from Mexico and Central America

The Interagency Assessment on Cocaine Movement (IACM) 22nd edition, which is the basis for the "Cocaine Availability Study" included in this report, describes methodology used to estimate the amount of export quality cocaine (78% purity in CY01) departing South America to the U.S. - and non-U.S. markets[50]. The IACM does not attempt to quantify the amount of cocaine entering specific states or geographical regions of the United States; however, it does provide the basis to formulate reasonable estimates for this type of analysis. The IACM provides the basis for formulating magnitude estimates of cocaine flowing to the United States through three distinct corridors: the Mexico/Central American (MX/CENTAM) Corridor, the Caribbean Corridor, and the Direct-to-U.S. Corridor. In CY01, 563 metric tons of cocaine was estimated to have departed South America to the United States; 72% (405 metric tons) was estimated to have transited the MX/CENTAM Corridor, almost all of which was destined to cross the U.S. Southwest border. Accounting for losses from transit zone seizures and consumption in the MX/CENTAM Corridor, availability estimates for cocaine arriving to the United States from this corridor can be calculated. The amount of cocaine being transshipped from the MX/CENTAM Corridor to the Caribbean Corridor, or from the Caribbean Corridor to the MX/CENTAM Corridor, is thought to have been small and is thus not factored into this study. The following chart shows the process used to ascertain seizure rates of cocaine arriving to the United States through the MX/CENTAM Corridor (quantities in metric tons).

[50] A new methodology was introduced in the IACM, 22nd Ed., which estimates the magnitude and distribution of cocaine flow to the United States. This new methodology has not yet been evaluated or proven.

	1998	1999	2000	2001
A. Export quality cocaine departing South America to United States.[11]	530	473	485	563
B. Percent of U.S.-bound cocaine transiting the MX/CENTAM Corridor.[11]	.59[51]	.54[52]	.66[53]	.72[54]
C. Amount of export quality U.S.-bound cocaine moving via MX/CENTAM Corridor.(A x B)	313	255	320	405
D. Consumption of export quality cocaine in Mexico and Central America.	25	25	25	25
E. Export quality U.S.-bound cocaine seized in Mexico and Central America.	64	60	78	89
F. Export quality cocaine available to enter U.S. through MX/CENTAM Corridor. (C - (D + E))	224	170	217	291
G. U.S. seizures of export quality cocaine arriving through MX/CENTAM Corridor.[55]	10.3	13.7	6.6	10
H. Percent of estimated cocaine flow seized. (G ÷F)	4.6	8.06	3.04	3.44

Cocaine seized arriving in the United States during the years CY98 to CY01 ranged from 3.04 to 8.06% of the estimated cocaine available to enter the United States from Mexico and Central America.

Seizure Rates Used to Estimate Mexico-produce Methamphetamine in the United States

The seizure rate for cocaine moving to the United States from the MX/CENTAM Corridor is consistently higher than the U.S. import seizure rate of Mexican heroin. Therefore, the high-end seizure rate used to estimate Mexico-produced methamphetamine is derived from the cocaine seizure rate. Since the heroin availability estimate is expressed as a range (13 to 18 metric tons) the low-end seizure rate, which is derived using the high-end estimate, is used to estimate the lower limit of Mexico-produced methamphetamine available in the United States. The following chart shows the range of seizure rates used to estimate Mexico-produced methamphetamine available in the United States.

	1998	1999	2000	2001
A. High-end seizure rate (cocaine).	4.60%	8.06%	3.04%	3.44%
B. Low-end seizure rate (heroin).	1.34%	.77%	2.28%	2.28%

Two explanations for the disparity in seizure rates may be the difference in operational focus placed on cocaine by law enforcement, or the capability of law enforcement to detect one drug better than the other. Drugs smuggled in large shipments may be more susceptible to higher seizure rates.[56] The

[51] The Interagency Assessment of Cocaine Movement, 17th Edition, March 1999
[52] The Interagency Assessment of Cocaine Movement, 19th Edition, February 2000
[53] The Interagency Assessment of Cocaine Movement, 21st Edition, February 2001
[54] The Interagency Assessment of Cocaine Movement, 22nd Edition, March 2002
[55] Seizure totals for cocaine seized at ports of entry or between ports of entry upon arrival into the United States were taken from the Interagency Assessment of Cocaine Movement, 22nd Edition, March 2002, Appendix C - Table 11 "U.S. Arrival Zone Seizures." Seizure totals of cocaine arriving in the United States, not at the Southwest border, from Mexico and countries in Central America were taken from the in the EPIC Internal Database.
[56] "Statistics and Analysis on Supply of and Trafficking in Narcotic Drugs and Psychotropic Substances – 1996: A Technical Report, prepared by the United Nations Office for Drug Control and Crime Prevention. This report looked at global seizure rates for heroin and cocaine for 1986 to 1996 and found that seizure rates for heroin were stable at

following chart shows the average shipment volume of cocaine, methamphetamine, and heroin seized at import into the United States from Mexico at the Southwest border.[57] (Amounts are shown in kilograms.)

	1998	1999	2000	2001
Cocaine	46	42	21	24
Methamphetamine	6	8	7	8
Heroin	1.5	2.3	4.8	6.3

between 8 and 15 percent, and consistently below the seizure rates for cocaine by 6% to 22% for the 10 year time period.

[57] Information used to obtain average volume of heroin seized at import into the U.S. includes a small amount of Colombian heroin. Only drugs that meet Federal Identification Number thresholds were used in obtaining the average load sizes.

Chapter 4: Estimate of Marijuana Availability in the United States

The Marijuana Availability Working Group (MAWG) was tasked with developing a methodology for making a reliable estimate of the amount of marijuana available in the United States on an annual basis, and with deriving such an estimate for 2001. In pursuit of this objective, the group examined and evaluated all available national-level data sources for their reliability and utility and proposed a number of different estimation approaches based on the data. Having reviewed the quality and limits of the data available, the group decided to adopt a two-phase methodology to separately derive the quantities of foreign and domestically produced marijuana available. This approach was designated the Marijuana Availability Model.

The Marijuana Availability Model uses estimates of marijuana production in Mexico developed by the Crime and Narcotics Center (CNC) as well as seizure statistics, both foreign and domestic, to derive an estimate of the amount of foreign produced marijuana available. The model uses cannabis eradication statistics along with plant yield estimates to calculate the availability of domestically produced marijuana. The methodology, underlying assumptions, and the limitations of the model are addressed in this report.

Based on the Marijuana Availability Model, the quantity of foreign-produced marijuana available in the United States in 2001 was at least 4,581 metric tons. This figure results from applying the simplest set of assumptions to the calculations underlying the derivation of the foreign availability estimate. As a consequence, it represents a lower limit to the desired result. Applying additional reasonable assumptions to the model, and thereby introducing additional uncertainties, yields estimates for the availability of foreign-produced marijuana as high as 7,135 metric tons.

The quantity of domestically produced marijuana that was available in the United States in 2001 is unknown. While the group did develop a methodology for determining such availability in the future, the uncertainty in the required data, some of which do not currently exist, is magnified by the model, and prevents the derivation of a credible estimate at this time. However, by making reasonable assumptions regarding the number of cannabis plants eradicated and the amount of marijuana potentially produced per cannabis plant, and applying a set of hypothetical values for the cannabis eradication rate, the model yields an estimate for the availability of domestic marijuana ranging between 5,577 and 16,731 metric tons.

In the course of developing a methodology for estimating marijuana availability, the Marijuana Availability Working Group identified a number of data limitations and intelligence gaps that significantly impact the accuracy and reliability of the resultant estimates. This report makes nine specific recommendations as to how best to address these limitations. The recommendations are focused principally on improving and expanding cannabis crop estimates both domestically and overseas and on improved collection and consolidation of seizure data.

Overview

Marijuana is the most available illicit drug throughout the United States. The demand for marijuana far exceeds that for any other illicit drug and the size of the American user population equates to steady profits for traffickers. Reporting from across the country identifies marijuana use among all age, ethnic, and economic groups. High levels of use are cited among youth in particular. The ready availability and popularity of the drug render it a significant threat to the health and safety of the nation.

Estimates of the number of marijuana users in the United States suggest that demand for marijuana far exceeds that of any other illicit drug. As of 2000, more than 76 million individuals aged 12

and older had tried marijuana in their lifetime, more than 18 million had used in the past year, and nearly 11 million in the past month, according to the National Household Survey on Drug Abuse (NHSDA). Furthermore, 2000 NHSDA data indicate that on an average day, 5,556 individuals try marijuana for the first time, of which 3,814 are aged 12 to 17.

The indoor and outdoor cultivation of cannabis in most regions of the country, as well as the presence of marijuana smuggled into the United States from foreign sources, contributes to the pervasiveness of the drug. Law enforcement reporting from every region identifies marijuana produced in the United States and Mexico as the most prevalent types available. Other marijuana types are available to varying degrees depending on the area of the country.

The MAWG was tasked with developing a methodology for making a reliable estimate of the amount of marijuana available in the United States. The group began by examining the Full Market Model approach developed by the Drug Enforcement Administration's Statistical Services Section. Upon examination of the model, the group decided that the complexity of the model, coupled with the uncertainty inherent in the multiple data sources involved, prevented its use in deriving a reliable estimate. In short, the accumulation of the uncertainties introduced at every step in the process would overwhelm all but the most general, order-of-magnitude final estimate. The group therefore decided that a preferable approach would be to develop a model that minimized the level of uncertainty by limiting the number of data sources used and the number of assumptions made.

With this in mind, the MAWG examined and evaluated all available national-level data sources for their reliability and utility and proposed a number of different estimative approaches based on the data. Having reviewed the quality and limits of the data available, the group decided to adopt a two-phase methodology to separately derive the quantities of foreign and domestically produced marijuana available. This approach was designated the Marijuana Availability Model.

Estimates

The MAWG developed a two-phased methodology to estimate marijuana availability. This approach, designated the Marijuana Availability Model, was adopted after careful examination of all available estimative methodologies and relevant data sources. The model derives separate estimates of the amount of the available marijuana produced outside the country and domestically. The model is based on the recognition that there currently exists a very limited set of reliable data points on which to make calculations, as well as on a desire to minimize the number and impact of required assumptions.

Foreign Produced Marijuana

The Marijuana Availability Model relies on a two step approach to determine the amount of foreign-produced marijuana available in the United States. In the first step, the model makes a direct estimate of the availability of marijuana produced in Mexico. In the second step, the model derives an estimate of the availability of foreign produced marijuana from other source countries based on a calculation of the effectiveness of U.S. Customs Service (USCS) enforcement efforts against shipments of marijuana produced in Mexico.

The approach relies on the validity of three primary data sources:

- CNC estimates of potential marijuana production in Mexico
- USCS border seizure statistics
- EPIC arrival zone seizure statistics

The model also makes four primary assumptions:

- The CNC estimates of potential marijuana production in Mexico are valid.
- All of the marijuana seized by USCS at the Southwest Border, unless otherwise identified, was produced in Mexico.
- All of the marijuana seized by USCS at non-Southwest Border Ports of Entry (POEs), unless otherwise identified, was produced in countries other than Mexico.
- The USCS marijuana seizure rate at the Southwest Border is reflective of the seizure rate at other POEs.
- All of the marijuana seized in the Arrival Zone is of foreign origin.

The reliability and validity of the underlying assumptions and data sources used are addressed in Section 4-A and 4-B.

Based on the Marijuana Availability Model, the quantity of foreign-produced marijuana available in the United States in 2001 was at least 4,581 metric tons. This figure results from applying the simplest set of assumptions to the calculations underlying the derivation of the foreign availability estimate. As a consequence of the nature of the assumptions, it represents a lower limit to the desired result. Applying additional reasonable assumptions to the model, and thereby introducing additional uncertainties, yields estimates for the availability of foreign-produced marijuana as high as 7,135 metric tons. (See Tables 4-3 and 4-4 in Section 4-A)

Domestically Produced Marijuana

The Marijuana Availability Model relies on three factors to calculate the quantity of domestically produced marijuana available in the United States:

- Domestic cannabis eradication totals
- Cannabis plant marijuana yield estimates
- The cannabis eradication effectiveness rate

At present there is no single agreed upon value for either of the first two factors and there are insufficient data on which to base a credible estimate of the value of the third factor. Therefore, no credible estimate of the amount of domestically produced marijuana is possible at this time — the quantity of domestically produced marijuana that was available in the United States in 2001 is unknown.

Nevertheless, to illustrate the application of the model, a range of reasonable hypothetical values for the three factors were input. Based on reasonable assumptions regarding the number of cannabis plants eradicated and the amount of marijuana potentially produced per cannabis plant, and applying a set of hypothetical values for the cannabis eradication rate, the model yields an estimate of the amount of domestic marijuana available ranging between 5,577 and 16,731 metric tons.

Table 4 - 1 Foreign Marijuana Available in the United States (1998-2001)

Table 4-1 details the derivation of estimates for 1998 through 2001

Calculations Based on Marijuana Availability Model	2001	2000	1999	1998
Marijuana Produced in Mexico[58]	7400	7000	6700	8300
Seized in Mexico[59]	2007	1619	1459	1062
Consumed in Mexico[60]	168	168	168	168
Mexican MJ Available at U.S. Border[61]	5225	5213	5073	7070
Marijuana Seized Arriving fm Mexico[62]	643	562	474	402
Seizure Rate[63]	12.3%	10.8%	9.3%	5.7%
Multiplier[64]	7.13	8.26	9.75	16.54
Non-Mexican MJ Seized at Border[65]	61	57	56	43
Non-Mexican MJ Available in U.S.[66]	435	471	546	711
Non-Mexican MJ Available at Border[67]	496	528	602	754
Foreign Marijuana Available at Border[68]	5721	5741	5675	7824
Marijuana Seized in Arrival Zone[69]	1140	1175	1012	782
Foreign Marijuana Available[70]	**4581**	**4566**	**4661**	**7042**

[58] CNC potential marijuana production estimates
[59] Host nation reporting of marijuana seizures in Mexico
[60] Consumption in Mexico based on estimated number of abusers reported in "*El Consumo de Drogas en Mexico: Diagnostico, Tendencias y Acciones*." Only 1998 data available. See Appendix C for derivation.
[61] Equal to (Marijuana produced in Mexico) — (Seized in Mexico) — (Consumed in Mexico)
[62] Based on USCS seizure statistics - Includes all seizures of marijuana identified as having originated in Mexico and all seizures of marijuana of unidentified origin occurring at Southwest Border ports of entry. Assumes that all marijuana seized at the SWB not otherwise identified was produced in Mexico. USCS seizure statistics are used to determine seizure rates specifically at POEs. See Appendix D for details.
[63] Equal to (Marijuana seized arriving from Mexico) / (Mexican marijuana available at U.S. border)
[64] Equal to (1 — (Seizure Rate)) / (Seizure Rate)
[65] Based on USCS seizure statistics - Includes all seizures of marijuana identified as having originated in countries other than Mexico and all seizures of marijuana of unidentified origin occurring at non-Southwest Border ports of entry. Assumes that all marijuana seized at non-SWB POEs not otherwise identified was produced in countries other than Mexico. See Appendix D for details.
[66] Equal to (Non-Mexican Seized at Border) x (Multiplier)
[67] Equal to (Non-Mexican Seized at Border) + (Non-Mexican Available in U.S.)
[68] Equal to (Mexican Available at U.S. Border) + (Non-Mexican Available at Border)
[69] Based on EPIC seizure statistics. EPIC seizure data are assumed to be more comprehensive than USCS statistics, including all arrival zone seizures.
[70] Equal to (Foreign Marijuana Available at Border) — (Marijuana Seized in Arrival Zone)

Table 4-2 details the application of the domestic portion of the Marijuana Availability Model to the currently available estimates of cannabis eradication for 2001 and of plant yield, while using three hypothetical figures for the eradication rate.

Table 4 - 2 Estimates of Domestic Marijuana Based on Cannabis Eradication

Program	Cannabis Plants Eradicated [71]
DCE/SP [72]	3,304,760
USFS/DOI [73]	845,413
Total [74]	4,150,173

Plant Yield [75]	Potential Marijuana Eradicated (mt)[76]
200 Grams [77]	830
448 Grams (~1 Pound) [78]	1859
1 Kilogram [79]	4150

		Domestic Marijuana Potentially Available [80]		
Plant Yield	Eradication Rate[81] =>	10%	15%	25%
200 Grams		7,470	4,703	2,490
448 Grams (~1 Lb.)		16,731	10,534	5,577
1 Kilogram		37,350	23,516	12,450

[71] Total number of cultivated cannabis plants reported eradicated under programs sponsored by each reporting authority. Does not include figures for eradication of non-cultivated, i.e. "ditchweed" plants. Totals are not necessarily mutually exclusive.
[72] Cultivated cannabis plants reported eradicated under DEA's Domestic Cannabis Eradication/Suppression Program (DCE/SP).
[73] Cultivated cannabis plants eradicated on U.S. public lands as reported by the U.S. Forest Service and the Department of the Interior.
[74] The National Guard Bureau maintains statistics on plants eradicated during operations conducted with the assistance of National Guard assets. These operations eradicated 2,869,051 cannabis plants in 2001. However, the majority of these operations involved assistance to USFS/DOI or agencies reporting results to DCE/SP in which case the results are included in those agencies' statistics.
[75] Estimated quantity of marijuana produced from a single cannabis plant.
[76] Potential marijuana eradicated in metric tons based on four separate estimates of plant yield. Equal to (Number of Plants Eradicated) x (Plant Yield)
[77] Upper limit of yield estimates used by Royal Canadian Mounted Police to estimate marijuana production in Canada.
[78] Yield estimate used by DCE/SP based on University of Mississippi study published in June 1992
[79] Yield estimate used by USFS
[80] Potential domestic marijuana available in metric tons after eradication but before domestic seizures; based on plant yield estimates and hypothetical eradication effectiveness rates.
[81] Three hypothetical eradication rates used to illustrate impact of eradication estimates on domestic marijuana availability determined through the Marijuana Availability Model

Subsequent Decrease in Availability

The availability of marijuana within the United States is further reduced by the impact of three factors:

1) **Domestic Law Enforcement Seizures**: There is no single source for determining the amount of marijuana seized by federal, state, and local authorities in the United States without federal involvement. Based on EPIC's EPIC Internal Database (EID), judged to be the most comprehensive reporting system available, some 282 metric tons of marijuana of indeterminate origin was seized within the United States, outside of the Arrival Zone, in 2001.

2) **Exports To Other Countries:** There is no way to estimate the amount of marijuana produced in the U.S. or imported into the U.S. from abroad that is subsequently exported to other countries. The figure is unknown.

3) **Loss:** There is no way to estimate the amount of marijuana lost through accident, fire, flood, etc. While it is not believed to be significant, the figure is unknown.

Recommendations

The MAWG recommends the following actions to improve the accuracy of future marijuana availability estimates:

Domestic Marijuana Availability

- Improve U.S. Seizure Data

  The MAWG recommends instituting a reliable single centralized database with mandatory reporting for recording marijuana seizures by federal, state, and local agencies.

- Develop Marijuana Signature Program

  The MAWG recommends initiating a study to determine the feasibility of instituting a marijuana signature program to determine the source of seized marijuana.

- Centralize Eradication Reporting

  The MAWG recommends instituting a single centralized database for reporting cannabis eradication with mandatory reporting by federal, and ideally, state and local agencies.

- Determine Plant Yield

  The MAWG recommends initiating a study to determine the current average marijuana yield from a cannabis plant.

- Institute Statistical Grow Surveys

The MAWG recommends developing and supporting a program to derive statistically valid estimates of cannabis cultivation on U.S. public lands. The program would include efforts such as the National Guard Bureau's development of remote technical means of spotting high probability grow areas and predicting the level of cultivation. One such program is the National Guard Bureau's Mississippi Counter-Drug Enforcement Decision Support System (MCEDSS). [For more information contact the National Guard Bureau - CD Special Projects Division at(703) 607-5634.] The group also recommends revisiting legal restrictions against surveillance on private lands using new technologies for the purpose of statistical sampling.

Foreign-Produced Marijuana Availability

- Institute Foreign Cultivation Surveys

  The MAWG recommends instituting foreign cultivation surveys in the three countries other than Mexico that constitute the primary source areas for foreign-produced marijuana in the United States – namely Canada, Colombia, and Jamaica. This would provide a mechanism for determining overall potential marijuana production impacting the United States and thereby provide a more direct estimate of foreign marijuana availability than currently possible with the Marijuana Availability Model.

- Determine Extent of Transshipment through Mexico

  The MAWG recommends instituting a study of the extent of transshipment of marijuana from other source countries through Mexico, thereby providing a more accurate estimate of foreign marijuana availability using the Marijuana Availability Model.

- Develop Reliable Foreign Consumption Estimates

  The MAWG recommends supporting international efforts, such as those being undertaken by the Organization of American States, to determine the level of marijuana consumption in source and transit countries.

- Develop Reliable Foreign Seizure Data

  The MAWG recommends supporting foreign governments in source and transit countries in developing valid accounting systems for marijuana seizures.

Section 4-A: Assumptions

CNC production estimates for Mexico are valid.

CNC marijuana production estimates are the only valid such estimates available. The estimates are based on a four phase approach that relies on high-quality imagery and a statistically valid random sample survey technique to determine the land area under cannabis cultivation. Cannabis cultivation estimates are subsequently converted to estimates of potential marijuana production. The approach results in estimates with an uncertainty of plus or minus five percent.

All of the marijuana seized by USCS at the Southwest Border, unless otherwise identified, was produced in Mexico.

It is highly unlikely that all of the marijuana seized by USCS at the Southwest Border is produced in Mexico. However, there is currently no way to estimate the quantity of marijuana produced in other countries, such as Colombia, that is transshipped through Mexico. No credible estimates of the amount of marijuana produced in Colombia have been made by the U.S. Government in over ten years. However, based on historical estimates of production in Colombia and the traditional impact of Colombian marijuana on the U.S. market, the fact that there have been only 10 significant seizures, totaling less than 16 metric tons, of marijuana identifiable in USCS seizure statistics as having likely originated in Colombia over the past six years indicates that significant quantities may be being smuggled to the United States via routes that disguise the shipments' origin. One such route could be transshipment through Mexico. A reduction in the ratio of marijuana of Mexican origin seized at the SWB would increase the estimate of foreign marijuana available.

Table 4-3 illustrates the impact on availability estimates that results from assuming that 10 percent and 20 percent of the marijuana seized at the Southwest Border is of non-Mexican origin. As is evident from the table, such assumptions increase the estimate for the amount of foreign marijuana available by 14 and 31 percent, respectively.

Marijuana seized at non-Southwest Border Ports of Entry, unless otherwise identified, was produced in countries other than Mexico.

It is not possible to gauge the validity of this assumption at this time. Greater confidence in the validity of the assumption would require a thorough review of all supporting data relevant to many of the close to 15,000 seizure incidents recorded by USCS in 2001. Even then the data available would detail, at best, movements of drug shipments and not the actual origins of the drugs themselves. It is often not possible to identify instances of transshipment of marijuana through third countries.

The USCS marijuana seizure rate at the Southwest Border is reflective of the seizure rate at other Ports of Entry (POEs).

It is very unlikely that the marijuana seizure rate recorded by USCS at other U.S. POEs mirrors that achieved at the Southwest Border. The obvious differences in smuggling methods encountered at the nation's airports, seaports and border crossings, as well as differences in staffing levels and enforcement techniques and priorities at other POEs, argue against the universality of a single seizure rate. In fact, it is reasonable to assume that, because of the nature of the smuggling methods used, the seizure rate at the other POEs is actually lower than that at the Southwest Border. If this is true, then the estimate of foreign marijuana availability would increase.

There is currently no way to estimate the effectiveness of enforcement efforts at POEs outside the Southwest Border area. Table 4-4 illustrates the effect on estimates of applying hypothetical seizure rates of 2, 5, and 10 percent to the availability model. As can be seen from the table, the three hypothetical rates increase the estimate of foreign marijuana availability by 56, 16, and 2 percent respectively.

All of the marijuana seized in the Arrival Zone is of foreign origin.

It is unlikely that all of the marijuana seized in the Arrival Zone - defined by EPIC as within 150 miles of the border for statistical purposes - is of foreign origin. Significant quantities of domestic marijuana are produced from cannabis grown on public lands within 150 miles of the Southwest Border. However, it is not possible to definitively determine the origin of all shipments of marijuana seized in the Arrival Zone based on the available data, nor is it possible at this time to make a reasonable assumption as to the ratio of foreign to domestic sourced marijuana seized.

Table 4 - 3 Foreign Marijuana Available in the U.S. (1998-2001)

Effect of Varying Seizure Rate at Non-Southwest Border Ports of Entry														
			2001			**2000**			**1999**			**1998**		
Marijuana Produced in Mexico		7400	7400	7400		7000	7000	7000		6700	6700	6700	8300	8300	8300
Seized in Mexico		2007	2007	2007		1619	1619	1619		1459	1459	1459	1062	1062	1062
Consumed in Mexico[82]		168	168	168		168	168	168		168	168	168	168	168	168
Mexican MJ Available at U.S. Border		5225	5225	5225		5213	5213	5213		5073	5073	5073	7070	7070	7070
Seizure Rate at Non-SWB POEs[83]		**2%**	**5%**	**10%**		**2%**	**5%**	**10%**		**2%**	**5%**	**10%**	**2%**	**5%**	**10%**
Multiplier		49	19	9		49	19	9		49	19	9	49	19	9
Marijuana Seized at Non-SWB POEs		61	61	61		57	57	57		56	56	56	43	43	43
Non-Mexican MJ Available in U.S.		2989	1159	549		2793	1083	513		2744	1064	504	2107	817	387
Non-Mexican Available at U.S. Border		3050	1220	610		2850	1140	570		2800	1120	560	2150	860	430
Foreign Marijuana Available at Border		8275	6445	5835		8063	6353	5783		7873	6193	5633	9220	7930	7500
Seized in Arrival Zone		1140	1140	1140		1175	1175	1175		1012	1012	1012	782	782	782
Foreign Marijuana Available		**7135**	**5305**	**4695**		**6888**	**5178**	**4608**		**6861**	**5181**	**4621**	**8438**	**7148**	**6718**

[82] Estimate is based on 1998 data; data for other years are not available.
[83] Three reasonable hypothetical seizure rates selected to examine impact on availability estimates.

Table 4 - 4 Foreign Marijuana Available in the U.S. (1998-2001)
Effect of Varying Mexican Content of Marijuana Seized Arriving from Mexico

	2001			2000			1999			1998		
Marijuana Produced in Mexico	7400	7400	7400	7000	7000	7000	6700	6700	6700	8300	8300	8300
Seized in Mexico	2007	2007	2007	1619	1619	1619	1459	1459	1459	1062	1062	1062
Consumed in Mexico	168	168	168	168	168	168	168	168	168	168	168	168
Mexican MJ Available at U.S. Border	5225	5225	5225	5213	5213	5213	5073	5073	5073	7070	7070	7070
Marijuana Seized Arriving from Mexico	643	643	643	562	562	562	474	474	474	402	402	402
Mexican Content of MJ Arriving fm MX[84]	100%	90%	80%	100%	90%	80%	100%	90%	80%	100%	90%	80%
Mexican Seized at U.S. Border	643	578.7	514.4	562	505.8	449.6	474	426.6	379.2	402	361.8	321.6
Seizure Rate	12.3%	11.1%	9.8%	10.8%	9.7%	8.6%	9.3%	8.4%	7.5%	5.7%	5.1%	4.5%
Multiplier	7.13	8.01	9.20	8.26	9.31	10.63	9.75	10.91	12.33	16.54	18.61	21.22
Non-Mexican MJ Seized at Border	61	125.3	189.6	57	113.2	169.4	56	103.4	150.8	43	83.2	123.4
Non-Mexican MJ Available in U.S.	435	1004	1745	471	1054	1800	546	1128	1860	711	1548	2619
Non-Mexican Available at U.S. Border	496	1129	1935	528	1167	1970	602	1231	2011	754	1631	2742
Foreign Marijuana Available at Border	5721	6354	7160	5741	6380	7183	5675	6304	7084	7824	8701	9812
Seized in Arrival Zone	1140	1140	1140	1175	1175	1175	1012	1012	1012	782	782	782
Foreign Marijuana Available	**4581**	**5214**	**6020**	**4566**	**5205**	**6008**	**4663**	**5292**	**6072**	**7042**	**7919**	**9030**

[84] Three hypothetical percentages selected to examine impact on availability estimates.

Appendix 4-B - Evaluation of Data Sources

Potential Marijuana Production in Mexico — CNC

CNC marijuana production estimates are the only valid such estimates available. The estimates are based on a four phase approach that relies on high-quality imagery and a statistically-valid random sample survey technique to determine the land area under cannabis cultivation. Cannabis cultivation estimates are subsequently converted to estimates of potential marijuana production using a conversion rate of 1.8 metric tons of marijuana per hectare of cultivated cannabis. The approach results in estimates with an uncertainty of plus or minus five percent.

Mexican Seizures — Host Nation

Estimates of marijuana seizures in Mexico are based on host country reporting and are believed to be reasonably accurate.

Consumption in Mexico — Host Nation

The estimate of marijuana consumption in Mexico is based on the number of abusers in Mexico reported in *"El Consumo de Drogas en Mexico: Diagnostico, Tendencias y Acciones."* The relevant survey data are from 1998. The derivation of the estimate is described in Appendix C. The figure is a conservative estimate, with the actual number believed to be higher by an unknown amount. A higher consumption total would reduce the quantity of marijuana available at the U.S. border, increasing the resultant seizure rate and thereby decreasing the estimate of foreign marijuana available.

Border Seizures — USCS

USCS statistics on seizures of marijuana at POEs are accepted as accurate, except for occasional instances involving erroneous data entries. However, interpretation of the data for the purposes of the Marijuana Availability Model involves introducing a significant level of uncertainty as a result of the assumptions that must be made when information on the origins of marijuana shipments is not available. The primary assumptions made are that unless otherwise identified marijuana seized at the Southwest Border originated in Mexico and marijuana seized at other POEs originated elsewhere. The same logic was applied in instances where the country of origin was listed in the data as the United States.

Arrival Zone / Domestic Seizures — EPIC

Seizure amounts reported for Arrival Zone and Domestic Seizures were taken from the EID and are assumed to be reasonably accurate. The seizure amounts reported by EPIC are based on voluntary reporting to EPIC by federal state, and local law enforcement agencies. All seizure amounts are unofficial estimates and may vary from actual or official amounts. Due to the lack of any mandatory, comprehensive, nationwide drug seizure reporting system, the statistics do not necessarily provide an accurate overview of drug trafficking or seizure trends.

Eradication Estimate — DCE/SP; NGB; USFS/DOI

There is no single consolidated figure for the number of cannabis plants eradicated in the United States in any given year. There is not even a single figure for eradication efforts involving federal agencies, let alone state and local agencies. DEA's Domestic Cannabis Eradication/Suppression Program (DCE/SP) maintains statistics for all cannabis eradication efforts undertaken by federal, state, and local agencies under the aegis of DCE/SP. The National Guard Bureau maintains statistics for all cannabis

eradication efforts involving National Guard assets. There is considerable overlap in reporting by the two programs and no way to determine the extent of double counting without examining the level of involvement by the two in each eradication operation recorded. In addition, the U.S. Forest Service (USFS) and the Department of the Interior (DOI) maintain statistics on cannabis eradication efforts on federal lands, some of which involve one or both of the other two agencies. Finally, there is, of course, no single database recording cannabis eradication by state and local agencies without federal involvement.

Cannabis Plant Yield - RCMP; USFS; DEA; U. Miss.

There is no single agreed upon estimate for the average quantity of marijuana that can be produced from a single cannabis plant. The Royal Canadian Mounted Police uses an estimate of 170 to 200 grams per plant in estimating marijuana production in Canada. DEA uses an estimate of approximately 1 pound (448 grams) per plant based on a University of Mississippi study published in June 1992 and the USFS uses an estimate of 1 kilogram.

Eradication Rate — Unknown

There is currently no basis upon which to derive a credible estimate of the effectiveness of domestic cannabis eradication efforts. The figure is **unknown**.

State / Local Seizures - Unknown

There is no single source for determining the amount of marijuana seized by state and local authorities in the United States without federal involvement. The figure is **unknown**.

Marijuana Exports — Unknown

There is no way to estimate the amount of marijuana produced in the United States or imported into the country from abroad that is subsequently exported to other countries. The figure is **unknown**.

Table 4 - 5 Estimated Marijuana Consumption in Mexico

Marijuana Consumption in Mexico		
Type of User	**Number[85]**	**MJ Consumed[86]**
Hardcore	334,731	122[87]
Occasional	438,298	46[88]
Total		**168**

[85] As reported in *"El Consumo de Drogas en Mexico: Diagnostico, Tendencias y Acciones."*
[86] In metric tons
[87] Assuming each hardcore abuser consumes 1 cigarette containing 1 gram of marijuana per day — (Number of hardcore abusers) x (365 days per year) / (1,000,000 grams per metric ton)
[88] Assuming each occasional abuser consumes 2 cigarettes each containing 1 gram of marijuana per weekend — (Number of occasional abusers) x (52 weeks per year x 2) / (1,000,000 grams per metric ton)

Appendix 4-C: Determination of Source of Foreign-Produced Marijuana from USCS Statistics

The following methodology was used to determine the source (Mexico vs. Other) of foreign-produced marijuana seized by U.S. Customs:

1. Generate report of USCS seizures in spreadsheet format for Calendar Year of interest for all seizure records in which the **Commodity Code** equals "MAR" (Marijuana). Include the following fields in the report: **Date**, **Quantity**, **Port of Entry**, **Conveyance**, **Origin**, **From**, **Via**, **Destination**, and **Incident Number**.

2. Sort on **From** field and calculate total **Quantity** for each country identified.

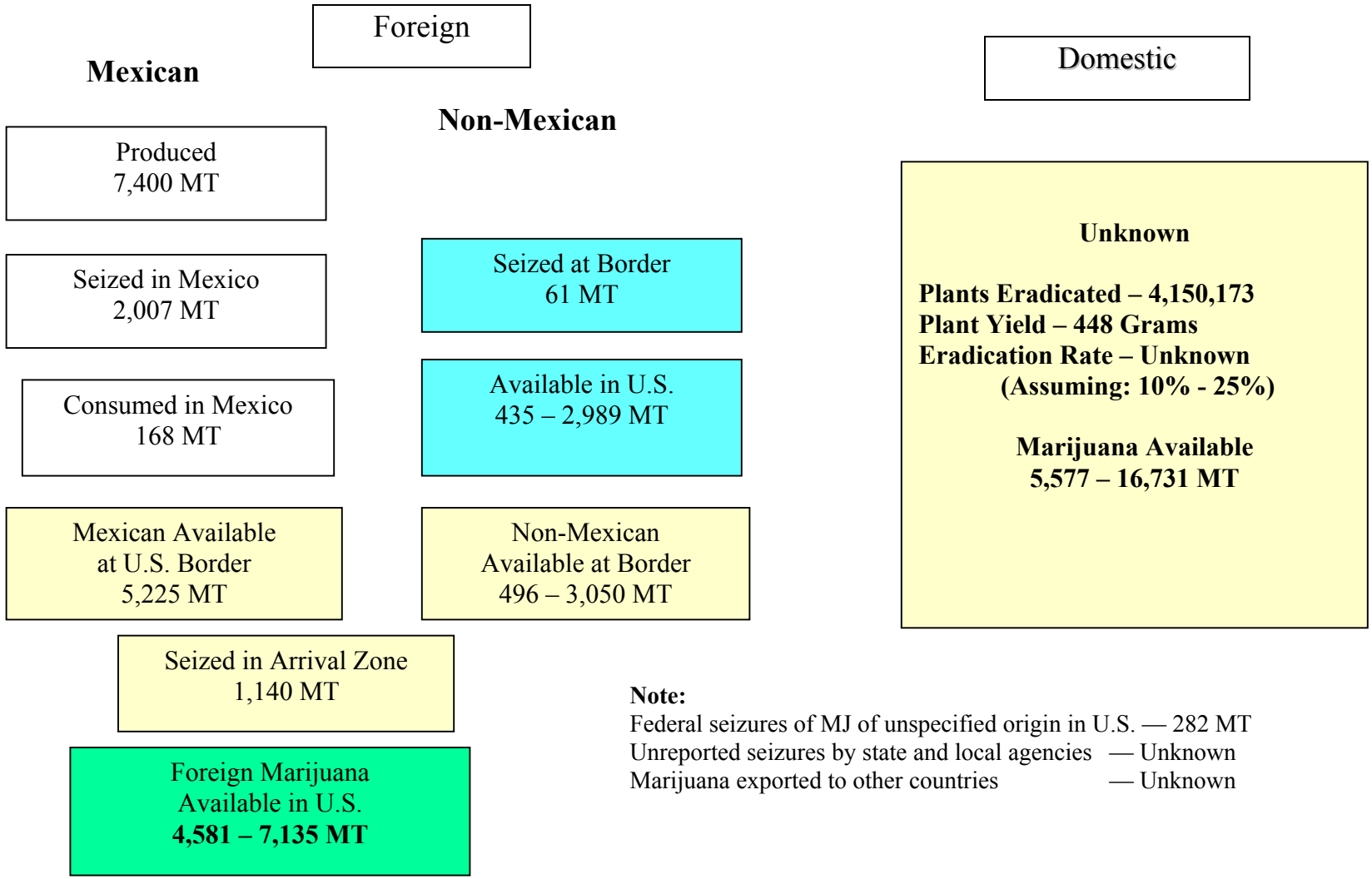
3. For records with a null **From** field, sort on **Origin**, **Via**, and **Destination** respectively to try to identify the country from which the marijuana was transported. Calculate total **Quantity** for each country identified.

4. For records with null entries in each of the fields listed above, sort on **Port of Entry** and calculate total **Quantity** for each POE identified. Assume that all seizures occurring at Southwest Border POEs were of marijuana produced in Mexico and that seizures occurring at other POEs were of marijuana produced in countries other than Mexico. For seizures occurring at POEs near but not on the Southwest Border, examine the **Conveyance** field and assume that shipments transported over land involved marijuana produced in Mexico and that shipments transported by other means involved marijuana produced in countries other than Mexico.

5. Total the Quantity of marijuana identified as having been produced in Mexico and the total identified as having been produced in countries other than Mexico.

Note: Identification of the origination of marijuana shipments seized by USCS would be made more accurate in the future by examining the details of the incident as reported in individual incident reports, identified using the Incident Number, for each seizure in which the origin of the shipment is in doubts.

Figure 4-1 - Marijuana Available in the U.S. - 2001



Note:
Federal seizures of MJ of unspecified origin in U.S. — 282 MT
Unreported seizures by state and local agencies — Unknown
Marijuana exported to other countries — Unknown

Chapter 5: Estimates of Drug Consumption in the United States

This report addresses estimates of the quantity of drugs consumed in the United States based on what is known about the drug user population and their drug use patterns. It begins by first assembling existing consumption estimates for the following four major drugs of abuse: cocaine, heroin, marijuana, and methamphetamine. While consumption estimates for these drugs are at varying degrees of refinement, all rely to some extent on assumptions about the drug user population and their drug use patterns. For each of these drugs, the major underlying assumptions – both explicit and implicit – utilized in arriving at the consumption estimates are reviewed and documented. By identifying the key assumptions driving the estimates, it then becomes possible to examine the impact of alternative assumptions on the total estimated volume of the drug consumed in the U.S. Given the limited time and resources allocated to this review, the focus is on how these estimates can be improved, both in the short-term as well as in the long-term.

The Working Group reviewed existing U.S. drug consumption estimates as a starting point. Since scientific work in this area is extremely limited, the group focused on both published material and the gray literature, which includes unclassified documents made available to the working group. Without endorsing any of the estimates, the Working Group examined four documents in detail.

While some of the estimation work reviewed stated working assumptions, there were many instances where key items were not explicit nor fully documented. The impact of these assumptions on resulting consumption estimates is not trivial. Therefore, the Working Group's focus was to examine the underlying and sometimes undocumented assumptions as an initial step; document these assumptions when possible or show knowledge gaps when there is limited information; and demonstrate how changing the values of a few key assumptions can shift the magnitude of resulting estimates up or down. In the absence of adequate time or resources to actually recalculate these estimates, the Working Group focused on identifying recommended steps to improving the consumption estimates in the short-term and in the long-term.

Overview

This report addresses estimates of the quantity of drugs consumed in the United States based on what is known about the drug user population and their drug use patterns. It begins by first assembling existing consumption estimates for the following four major drugs of abuse: cocaine, heroin, marijuana, and methamphetamine. While consumption estimates for these drugs are at varying degrees of refinement, all rely to some extent on assumptions about the drug user population and their drug use patterns. For each of these drugs, the major underlying assumptions – both explicit and implicit – utilized in arriving at the consumption estimates are reviewed and documented. By identifying the key assumptions driving the estimates, it then becomes possible to examine the impact of alternative assumptions on the total estimated volume of the drug consumed in the U.S. To the extent that the consumption estimates can be extended to the year 2000, this reference year is used. Given the limited time and resources allocated to this review, the focus is on how these estimates can be improved, both in the short-term as well as in the long-term.

The report is organized as follows: first, the background and methods behind this review are described. Next, consumption estimates for each of the four drugs are addressed in turn, focusing specifically on making explicit the key assumptions underlying existing estimate(s), demonstrating the impact of alternative key assumptions on such estimates, and assessing the outlook for improving consumption estimates given available or soon-to-be-available data sources.

Background And Methods

The *Consumption Working Group*, hereafter referred to as the Working Group, was tasked by the *Drug Flow Models Steering Committee*, an interagency committee. The Working Group consisted of six representatives from the following agencies:

- Crime and Narcotics Center (CNC)
- Drug Enforcement Administration (DEA)
- National Drug Intelligence Center (NDIC)
- National Institute of Justice (NIJ)
- Office of National Drug Control Policy (ONDCP)
- Substance Abuse and Mental Health Services Administration (SAMHSA).

The Working Group reviewed existing U.S. drug consumption estimates as a starting point. Since scientific work in this area is extremely limited, the group focused on both published material and the gray literature.[89] In this instance, only one published document provides consumption estimates for four drugs (cocaine, heroin, marijuana, and methamphetamine), and an appendix to another published document provides consumption estimates for heroin specifically. From the unclassified documents made available to the working group, an internal, albeit preliminary document attempts to update consumption estimates for the same four drugs listed above, and an interagency memo documents an estimate for heroin consumption. Without endorsing any of the estimates, the Working Group examined the following documents in detail:

- *What America's Users Spend on Illegal Drugs, 1988-2000* (December 2001), a study commissioned by the Office of National Drug Control Policy and conducted by Abt Associates, Inc. to develop U.S. consumption estimates for heroin, cocaine, marijuana, and methamphetamine

- *Full Market Model* developed separately for heroin, cocaine, marijuana, and methamphetamine by the Drug Enforcement Administration's Statistical Services Section (documented in a memo from Patrick R. Gartin to Martin W. Pracht, December 19, 2001)

- *Interagency Domestic Heroin Threat Assessment 2000* prepared by the National Drug Intelligence Center, specifically "Appendix B: Heroin Consumption in the United States," and

- *A Direct Approach to Estimating Heroin Consumption* and a similar argument for cocaine developed by the Crime and Narcotics Center (documented in a memo from Stanley E. Hillard to Patrick R. Gartin, November 7, 2001).

Pertinent sections of the four documents identified above are reproduced as Section 5-B through Section 5- E of this report.

[89] Inclusion of the "gray literature" is essential to a comprehensive review when little formal scientific work is available. It becomes even more important to include the unpublished sources in situations when they are the source of estimates that are reported to decision-makers and used in policy discussions. For example, while an interagency estimate of 18 metric tons of heroin consumption annually is not documented in a published source, such an estimate can take on a life of its own.

While some of the estimation work reviewed stated working assumptions, there were many instances where key items were not explicit nor fully documented. The impact of these assumptions on resulting consumption estimates is not trivial. Therefore, the Working Group's focus was to examine the underlying and sometimes undocumented assumptions as an initial step; document these assumptions when possible or show knowledge gaps when there is limited information; and demonstrate how changing the values of a few key assumptions can shift the magnitude of resulting estimates up or down. In the absence of adequate time or resources to actually recalculate these estimates, the Working Group focused on identifying recommended steps to improving the consumption estimates in the short-term and in the long-term.

Drug Consumption Estimates

Estimating consumption of illicit drugs poses a myriad of problems that defy the best efforts of researchers to collect data appropriate for meaningful statistical analyses at the national level or to provide a realistic description of the nature and quantity of the narcotics abusing population and the underground markets in which they operate.

In general, there are several data issues that affect the existing consumption estimates, regardless of the type of drug. The following paragraphs address five key issues.

First, the number of chronic or hard-core users is a long-standing estimation problem, given that a large proportion heavy users of illicit drugs – who account for a substantial proportion of drugs consumed – are not adequately covered in conventional data sources, such as the National Household Survey on Drug Abuse (NHSDA). The hidden nature of this population contributes to the difficulty in accurately portraying the magnitude of total drug use. Furthermore, the terminology and definitions attached to the heaviest users of drugs, such as "chronic user," "hard-core user," or "addict," may or may not coincide with clinical definitions of drug abuse and dependence.

Second, existing estimates do not typically distinguish between addicted users and the so-called "casual users" – often, the latter are not included in the calculation of consumption estimates. For a commonly used illicit drug such as marijuana, the volume consumed by "casual users" is not insignificant.

Third, dosage assumptions often are poorly documented and there appears to be a significant gap in the scientific measurement of typical doses, as well as of typical frequency of dosing. This is complicated by the phenomenon of multi-drug use or substitution, particularly in the context of unsteady supply, so that one cannot safely assume that even an addicted user uses a given amount steadily over time.

Fourth, key data sources used in consumption estimation, specifically the Arrestee Drug Abuse Monitoring (ADAM) program data, are collected at a sub-national level that do not translate to national estimates. The transition from city- or metropolitan area-based information to national assumptions is not adequately justified. Efforts to expand and improve this data source to yield national estimates appear to be in jeopardy at this time.

Fifth, estimates deriving from drug market dynamics, including cash and in-kind transactions, typically use assumptions that are undocumented. There are few sources of data on this subject – beyond

anecdotal information, only ADAM and the 2001 NHSDA[90] are anticipated to provide concrete data, albeit limited to specific geographic areas or a specific drug.

While not exhaustive, these are illustrative of the specific items that are examined in this report.

The remainder of this section reviews the key data sources used in consumption estimations and then each set of drug-specific consumption estimates is examined in greater detail. The drug-specific subsections address the starting assumptions and their accompanying ambiguities, summarize existing estimates, show illustrative alternative estimates based on modifying values of key components, and identify what improvements can be implemented to refine these estimates in the future.

Key Data Sources

The following data sources are considered essential in arriving at the existing consumption estimates:

- National Household Survey on Drug Abuse
- Arrestee Drug Abuse Monitoring Program/Drug Use Forecasting system
- Uniform Crime Reports
- System To Retrieve Information from Drug Evidence
- Treatment Episodes Data Set
- Domestic Monitor Program

Each of these key sources represents a piece of the picture of illicit drug use. Each has strengths and limitations. It is essential to recognize these at the outset in order to assess the utility of estimates derived using these data as building blocks, as well as the impact of various assumptions and adjustments made in the process of estimating consumption.

- ***National Household Survey on Drug Abuse:*** Existing estimates of drug consumption rely heavily on NHSDA data. It is the Nation's most comprehensive survey of drug use. It measures drug use among the American household population age 12 and older, as well as among people living in group quarters and the homeless living in shelters. Despite the rigorous methods applied by NHSDA researchers and the breadth of the study, there are limitations to the data it provides. The survey's sampling procedures, for example, include only individuals who are part of a household. Thus, transients; incarcerated prisoners; and residents of hospitals, nursing homes, and mental institutions are not included in the survey's sample.[91]

  An additional complication with relying upon data that is collected from users themselves is that these users may knowingly or unknowingly misrepresent the frequency or severity of their drug use. The NHSDA does employ techniques that are designed to minimize the lack

[90] The *2001 NHSDA Computerized Questionnaire and Specifications (CAPI and ACASI)* includes a new section on market information for marijuana.

[91] The NHSDA covers residents of households (living in houses/townhouses, apartments, condominiums, etc.) noninstitutional group quarters (e.g., shelters, rooming/boarding houses, college dormitories, migratory workers' camps, halfway houses, etc.) and civilians living on military bases. While the survey covers these types of units (they are given a nonzero probability of selection), sample sizes of most specific groups are too small to provide separate estimates. Persons excluded from the survey include homeless people who do not use shelters, active military personnel, and residents of institutional group quarters, such as correctional facilities, nursing homes, mental institutions, and hospitals.

of truthfulness on the part of the interviewees. For example, the survey administrators emphasize to the respondents that their confidentiality will be maintained and computers are used so that respondents can self-interview to ensure greater privacy.[92] The NHSDA also incorporates techniques such as repetitious questioning that assist in soliciting factual responses from interviewees. In spite of these efforts, it must be assumed that a portion of the responses to the survey is inaccurate.

- ***Arrestee Drug Abuse Monitoring Program/Drug Use Forecasting System:*** A major segment of the less-stable population of chronic drug users – those that are arrested – is well represented in data collected by the ADAM program, formerly known as *the Drug Use Forecasting* (DUF) program. The National Institute of Justice sponsors this data collection program. As the successor to the DUF program, which operated first in 13 sites and later in 23 sites from 1987 to 1997, ADAM serves as a source of information about the drug use of people who are arrested. At ADAM sites, within 48 hours of arrest research teams in cooperation with local criminal justice officials and staff quarterly interview and urine-test individuals arrested and brought to local lockups and booking centers. ADAM routinely employs urine testing as an objective measure of drug use by arrestees. Drug-related variables include self-reports on drug using patterns, how and where arrestees purchased illicit drugs, an index of questions on risk of alcohol and other drug dependency, and experience with drug and mental health treatment. After the interview each ADAM respondent is asked to provide a urine sample for laboratory testing. Arrestees are asked to voluntarily produce urine specimens for analysis. Urinalysis confirms whether the interviewees have used any of up to 10 types of drugs during the two to three days before the interview. ADAM/DUF is the only federally funded data system where urinalysis is utilized to add credence to estimates of drug use when self-reports are unreliable.

  In 1998, ADAM data collection was expanded from 23 to 35 sites. In 2000 probability-based sampling plans for male arrestees were instituted for each site and an enhanced interview schedule for adult respondents was introduced. In its new form, ADAM now collects data about the involvement of arrestees with drug treatment and drug markets. Also, starting in 2000, sites are able to provide estimates with known precision, and track trends in drug use within their community and in comparison to other communities. ADAM allows researchers to place confidence intervals around estimates so that researchers and policymakers can assess the significance of trends. One of the limitations of ADAM is that it exists in only 35 communities and does not represent a national sample of arrestees. It is unknown at this time whether NIJ's ultimate goal to expand ADAM to a total of 75 sites in order to collect drug data at the national level[93] is on track.

- ***Uniform Crime Reports*:** The Federal Bureau of Investigation (FBI) Criminal Justice Information Services Division compiles and aggregates arrest statistics under the *Uniform Crime Reports* (UCR) program. The purpose of UCR is to measure law enforcement response to crime and to provide data concerning the age, sex, and race of perpetrators. Data are supplied voluntarily by law enforcement agencies across the country on a monthly basis. FBI staff perform various edit checks. UCR does not include bookings for warrants, revocations and some other reasons for being booked, so it understates bookings. While UCR

[92] Confidentiality is stressed in all written and verbal communications with potential respondents, respondents' names are not collected with the data, and computer-assisted interviewing (CAI) including audio computer-assisted self-interviewing (ACASI) are used to provide a private and confidential setting to complete the interview.

[93] The White House, *National Drug Control Strategy, FY 2003 Budget Summary*, February 2002, p. 129.

data are supported by records of local law enforcement agencies, not all agencies supply data for all 12 months of each year.

Drug-related variables include arrests for drug abuse violations; breakdowns for sale/ manufacture and possession; and drug types, including heroin or cocaine and their derivatives, marijuana, synthetic or manufactured drugs, and other dangerous, nonnarcotic drugs. UCR data can yield characteristics of drug arrestees. In using UCR data for drug consumption estimation, certain charges were often assumed to be more likely related to chronic drug use. The basis of these assumptions are largely undocumented.

- **System To Retrieve Information from Drug Evidence:** The *System To Retrieve Information on Drug Evidence* (STRIDE), operated by the DEA, is the primary source of data for drug price and purity, providing lab analyses of street-level drug purchases. STRIDE maintains an inventory of drug exhibits submitted to DEA laboratories and contains all the information from the laboratory analysis of each exhibit. The data elements include information on place collected, how acquired (e.g., purchased, seized), price if purchased, name of the drug, potency of the drug, adulterants and diluents found, and how the exhibit was packaged. STRIDE information is used as an investigative tool by agents in the field and provides a database which is used to analyze both strategic and tactical intelligence, establishing drug-trafficking patterns as well as detecting the appearance of new drugs. Because the purpose of STRIDE is primarily in support of operations, the representativeness of the data for research and estimation purposes is limited.

- **Treatment Episodes Data Set:** The *Treatment Episode Data Set (*TEDS*)* is a minimum data set of information collected by SAMHSA about individuals admitted to treatment, primarily by providers receiving public funding. The TEDS universe consists primarily of those substance abuse treatment facilities that receive public funding through from State Substance Abuse Agencies. TEDS includes patient-level data on admissions to these facilities and contains data on approximately 1.6 million admissions per year from 1992 to the present. Variables include drug use history, clinical and treatment data, and patient demographics. While publicly funded treatment providers comprise a major segment of all providers, TEDS data do not cover the entire treatment population.

- **Domestic Monitor Program:** The *Domestic Monitor Program* (DMP), conducted by DEA's Intelligence Division, is a heroin purchase program designed to provide data on the purity, price, and origin of retail-level heroin available in the open-air drug markets in 23 metropolitan areas of the United States. Each quarter, the DEA provides funding for the undercover purchase of retail-level heroin, and each heroin purchase subsequently undergoes chemical analysis to determine the purity, adulterants, diluents, and geographic origin of heroin sold at the retail level in the 23 cities. DMP purchases are included in the broader STRIDE data described above (Section 3.1.4).

- **Other Data Sources:** In addition, the Drug Abuse Warning Network (DAWN) and the Community Epidemiology Work Group (CEWG) are frequently cited as sources of location-specific information, and the *Full Market Model* estimates use the Monitoring the Future study.

Elements of each data source that are particularly relevant to a specific drug are discussed greater detail in the following sections.

Cocaine Consumption Estimates

Since 1991, ONDCP has published a biennial report on expenditures by Americans on illegal drugs. The current version of *What American's Users Spend on Illegal Drugs* (Office of National Drug Control Policy, 2001b), prepared by Abt Associates, Inc., provides comparable estimates of cocaine consumption by Americans for the years 1988 through 1999, and projects estimates for 2000. Abt Associates acknowledges that because of the quality of available data, there is considerable imprecision in estimates of the number of chronic and occasional users of drugs, the retail sales value of their drug purchases, and the amount of drugs they consume. That said, they also believe that the data are sufficiently reliable to conclude that the trade in cocaine has decreased over the last ten years.

The best estimates reported as a result of the study are the following:

- In 1999, about 2.8 million Americans were chronic cocaine users and about 3.2 million were occasional cocaine users.
- The number of occasional cocaine users dropped from 6.0 million in 1988. The number of chronic cocaine users has declined over the last decade (the figure was 3.6 million in 1990).
- In 2000, Americans spent about $36 billion on cocaine.
- During the latter part of the 1990s, Americans consumed about 271 metric tons of cocaine per year, down from over 300 metric tons earlier in the decade (Table 5-1).

Table 5 - 1 Total Amount of Cocaine Consumed, 1994-2000 (in metric tons)

	YEAR						
	1994	1995	1996	1997	1998	1999	2000
Cocaine	323	321	301	275	267	271	259

Source: Office of National Drug Control Policy. *What America's Users Spend on Illegal Drugs, 1988-2000.* December 2001.

Assumptions

Methodology. The study *What America's Users Spend on Illegal Drugs* derives estimates of consumption. The study is theoretically sound and relies on manipulating a number of estimated variables which themselves require acceptance of some heroic assumptions and are subject to substantial margins of error. However, it is believed that the Abt Associates' study is the best effort to determine the amount of cocaine consumed by Americans in the last decade.

The study relies heavily on the NHSDA. As noted earlier, this survey misses a part of the population that is a key to determining the extent of cocaine use: those chronic drug users who, although not homeless, are too unstable to be considered as part of a household, or who, if part of the household, are unlikely to truthfully self-report.

The study also relies on ADAM/DUF data to shed light on the less-stable population of chronic drug users. Since the data used for the Abt study predate ADAM, this discussion focuses on DUF. Based on self-report and urinalysis of arrestees in 24 cities, Abt's calculation begins by estimating the number of chronic cocaine users who are arrested during the year. A chronic user is defined as those who admitted to using cocaine on more than 10 days during the month before being arrested. That number is then divided by the average number of arrests that chronic cocaine users generate during that year. Then the estimated number of chronic users in jails and is prison subtracted, because they are unlikely to use

cocaine heavily while incarcerated. Abt projected that chronic cocaine users in 2000 numbered 2.7 million.

The next step was to estimate how much the users spend on cocaine. An estimate of the retail sales value of illicit drugs consumed by heavy users follow from multiplying estimates of typical expenditures by estimates of the number of chronic users. Estimates of expenditures by chronic users are then converted to units measured in kilograms of cocaine, so that amount consumed can be compared with the amount of drugs trafficked into the country. This requires an estimate of the prevailing retail prices for illicit substances. Dividing the estimate of retail sales value by the prevailing price paid by users gives an estimate of the total amount of drugs purchased, and this amount can be converted readily into metric ton units.

Chronic users account for about ¾ of the cocaine used in this country, they do not account for **all** illicit drug consumption. The NHSDA provides a reasonably accurate estimate of the amount of more casual drug use. To estimate the number of occasional users, NHSDA data on the number of people who reported cocaine use in the last year were used, minus the number that reported using cocaine on a weekly basis. There were about 2.7 million chronic users and 3.0 million occasional users estimated for 2000 (Table 5-2). The report complements expenditures by chronic users on cocaine based on DUF data with expenditures on cocaine by more casual users who report to the NHSDA. For 2000, Abt projects that chronic and occasional users spent $35 billion on cocaine and that Americans consumed 259 metric tons.

Table 5 - 2 Estimated Number of Chronic and Occasional Users of Cocaine (thousands), 1994-2000

	YEAR						
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Chronic	3,032	2,866	2,828	2,847	2,800	2,755	2,707
Occasional	2,930	3,082	3,425	3,487	3,216	3,216	3,035

Source: Office of National Drug Control Policy. *What America's Users Spend on Illegal Drugs, 1988-2000.* December 2001.

Determining Chronic Users: The method for computing the national numbers for chronic and occasional cocaine users are a composite of local area estimates and extrapolated to the national estimates. These estimates are derived from DUF data, last collected in 1999. Thus, the data used to derive a national chronic user projection for 2000 was 1999 data. Also, DUF only represents 23 central city jails and lockups. To expand the data to the county in which the jail was located, the chronic user population, which was found in the jail, was multiplied by 1.45% to account for users in the general population in the county or metropolitan statistical area (MSA). The Abt approach necessarily assumes that all hardcore drug users have an appreciable probability of being arrested. It in unknown whether the data collected at DUF sites is even representative of the research catchment areas themselves, let alone places where DUF did not collect data. Abt does spend time explaining how they account for under-reporting of drug use by using the urinalysis results to adjust their estimates. However, Abt does not adequately explain how they adjust for under-reporting of past arrests. Abt explains that they relied on a 1995 DUF Addenda study to arrive at their estimate that there are 2.5 chronic users in the general county population for every chronic user found in the arrestee population. However, this 1995 study occurred in only 6 cities (Chicago, Manhattan, Portland, San Antonio, San Diego and DC). Is it reasonable to base the entire national hardcore rates on the results from these six (mostly large urban) cities?

Because of the self-reporting of the data, which was substantiated with urinalysis in many cases, the chronic user population discovered at the jail was increased by 1.167% to account for underreporting on the part of the inmates.

Because Abt was skeptical of the DUF estimates for women, they simply adjusted the data based on aggregate arrest statistics compiled by the FBI under the Uniform Crime Reports (UCR). According to UCR, men account for 78% of all arrests. Abt made a simple adjustment based on UCR data to add 22% to account for female chronic users.

DUF is not a probability sample. For that reason it could not be used by itself to extrapolate to the national population so the UCR was used. UCR does not include bookings for warrants, revocations and some other reasons for being booked, so it understates bookings. Also, the UCR does not specify bookings by felony, misdemeanor and other categories, so the research imputed the proportion of felonies and misdemeanors based on an analysis of actual booking data from several sites. Some jurisdictions did not report data for the entire year. Certain charges were assumed to be more likely related to chronic drug use. These tabulations provided estimates of the probability that an arrestee would be a chronic user conditional on the charged offense and year. These charges were tabulated on a national level, but little explanation is provided on how locality-based data were extrapolated to the United States as a whole.

Not accounting for persons arrested as juveniles appears to be a major omission. This omission must be due to the fact that no good data exists on juvenile arrestee drug use (DUF/ADAM collect data on juveniles in only a small number of sites, mostly boys with few girl participants, using convenient sampling methods). However, the DUF data, which we do have, show fairly high proportion of heavy drug users among juvenile arrestees.

There are several assumptions working here which may or may not be valid. Without a probability sample, the effort to calculate how many chronic users there are in the United States will remain a little bit better than guesswork.

How much do they spend? Expenditure patterns are an under-researched aspect of drug consumption. The Abt study used DUF data to determine how much users spend on drugs. The Abt study tabulated the costs for each of the 23 sites for each of the eleven years and computed the median expenditure on drugs. Unfortunately, the questions from which the data was derived asked how much users spend on drugs per se, not about expenditures on a specific type of drug. The median amount was used and weighted per site by numbers of users at that particular site. Those estimates over $2000 were thrown out. The study eliminated those who were dealers. Some of the respondents had trouble answering the questions.[94] The resulting means were $237 for cocaine. Average retail purchase, average dosage, frequency of use (chronic), frequency of use (occasional), retail price per pure gram (STRIDE) are not discussed in the report. In 1993, based on NHSDA data, occasional users were estimated to spend $35 per week. More recent price estimates are unavailable; adjustments were made for the consumer price index. The report determined that $212 was spent a week on cocaine per chronic user; $35 a week for occasional users.

The report also accounted for 'income in kind'. It increased cocaine consumption by 11 percent to account for income in kind, and added it to increase the total metric tons. This adjustment for income-in-kind has been 11 percent since 1995. It appears that by adding the 11 percent to the metric tons number, rather than to the price indicators, the report is double counting. The report multiplied the number of the original chronic with several adjustments to account for female, counties, underreporting, etc. Income in kind is already accounted for in the number of users.

Existing Consumption Estimates

The Abt method for calculating cocaine consumption is to first estimate the number of occasional and chronic cocaine users, estimate their weekly expenditures to calculate total expenditures, then divide

[94] The 2000 ADAM data may mitigate some of the problems associated with this set of calculations.

that expenditure total by an estimate of retail cocaine prices (Office of National Drug Control Policy, 2001a). Table 5-3 below summarizes the figures used in calculation of consumption, and table 5-4 summarizes the price data.

Table 5 - 3 Calculation of domestic cocaine consumption, 1996-2000

		YEAR				
Description	**Units**	**1996**	**1997**	**1998**	**1999**	**2000**
Number of occasional users	thousands	3,425	3,487	3,216	3,216	3,035
Number of chronic users	thousands	2,828	2,847	2,800	2,755	2,707
Weekly expenditure by occasional users	Constant 2000 dollars	$35	$35	$35	$35	$35
Weekly expenditure by chronic users	Constant 2000 dollars	$220	$188	$197	$206	$212
CPI adjustment		1.10	1.07	1.06	1.03	1.00
Total Expenditures for occasional users[1]	Constant 2000 dollars (billion)	$6.9	$6.8	$6.2	$6.0	$5.5
Total Expenditures for chronic users[2]	Constant 2000 dollars (billion)	$32.4	$27.9	$28.7	$29.5	$29.8
Total Expenditures for all users[3]	Constant 2000 dollars (billion)	$39.2	$34.7	$34.9	$35.6	$35.3
Retail Prices	Constant 2000 dollars per pure g	$144	$140	$145	$145	$152
Barter purchases	percentage	11%	11%	11%	11%	11%
Total consumption[4]	metric tons	301	275	267	272	259

[1]Total expenditures for occasional users=((Number of occasional users)*(Weekly expenditure by occasional users)*(CPI adjustment)*52)/1,000,000,000

[2] Total expenditures for chronic users=((Number of chronic users)*(Weekly expenditure by chronic users)*(CPI adjustment)*52)/1,000,000

[3] Total expenditures for all users=(Total expenditures for occasional users) + (Total expenditures for chronic users)

[4]Total consumption=((Total expenditures)/(Retail Price*1,000))*(1+Barter Purchases)

Source:

Alternative Consumption Estimates

In general, Abt often fails to enumerate and properly document their assumptions in arriving at national hardcore drug use estimates. It would be helpful if Abt explained the rationale for their assumptions, do sensitivity analyses with respect to it, and communicate how it might affect results and the associated confidence intervals. Also, Abt does not provide adequate enough documentation for others to comment on, critique and suggest improvements in his methods. Abt needs to provide a rich description of what was done, why it was done, how it was done, the strengths and limitations, and assumptions in a form that is accessible to other researchers to allow a serious review.

Abt work relies on DUF data, prior to probability-based sampling. It in unknown whether the data collected at DUF sites is even representative of the research catchment areas themselves, let alone places where DUF did not collect data. This situation is rectified for the men in ADAM where

representative sampling is used. If there is as little as a 10% swing in either direction, the numbers represented could fluctuate as much as from 231 metric tons to 281 metric tons in annual consumption.

Abt says that a simple adjustment is put in place to deal with the fact that their model is calculated for just men. Abt states that they are very skeptical of the DUF estimates for women so he simply adjusts the data based on aggregate FBI arrest statistics. The FBI estimates that 78% of all arrests are for men so they increase their estimates by 1/.78 or by 1.28. This is a huge logical leap to assume men and women use at the same rate. To the extent that this assumption is not true Abt's estimates can be off considerably. It might have been nice to see what the DUF data say about women and compare it to this very blunt approach. If we assume that women do not use as much as men and increase the rate by 10% instead of 28% to account for women's use the estimate would change considerably. Now we have a range of 201 metric tons to 284 metric tons. If one assumes that the 11% accounted for in income in kind is low, adjust for 25% in the income in kind figure and the consumption figures could go as high as 320 metric tons.

Not accounting for persons arrested as juveniles appears to be a major omission. This omission must be due to the fact that no good data exists on juvenile arrestee drug use (DUF/ADAM collect data on juveniles in only a small number of sites, mostly boys with few girl participants, using convenient sampling methods). However, the DUF data which we do have show fairly high proportion of heavy drug users among juvenile arrestees. If we added 5% for juvenile chronic users our total consumption would be 268MT with everything else being equal.

Table 5 - 4 Alternative Estimates of Cocaine Consumption, 2000

Description	Units	ALTERNATIVE ESTIMATES				
		2000	**2000 –10%**	**2000 +10%**	**2000 +5% for juvenile chronic users**	**2000 –12% (decrease 12% for women)**
Number of occasional users	thousands	3,035	2,732	3,338	N/A	3,035
Number of chronic users	thousands	2,707	2,437	2,977	2,842	2,437
Total Expenditures for occasional users[1]	Constant 2000 dollars (billion)	$5.5	$4.9	$6.1	$5.5	$5.5
Total Expenditures for chronic users[2]	Constant 2000 dollars (billion)	$29.8	$26.8	$32.8	$31.3	$26.8
Total Expenditures for all users[3]	Constant 2000 dollars (billion)	$35.3	$31.7	$38.9	$36.8	$31.3
Total consumption with 11% barter purchases[4]	metric tons	259	231	284	268	288.5
Total consumption with 25% barter purchases[5]	metric tons	290	261	320	302	257

[1]Total expenditures for occasional users=((Number of occasional users)*(Weekly expenditure by occasional users)*(52 weeks)/1,000,000,000

[2] Total expenditures for chronic users=((Number of chronic users)*(Weekly expenditure by chronic users)*(52weeks)/1,000,000

[3] Total expenditures for all users=(Total expenditures for occasional users) + (Total expenditures for chronic users)

[4]Total consumption with 11% barter purchases=((Total expenditures)/(Retail Price*1,000))*(1+ .11))

[5]Total consumption with 25% barter purchases=((Total expenditures)/(Retail Price*1,000))*(1+ .25))

Outlook for Refining Consumption Estimates and Recommendations

- Use the ADAM data to determine how many chronic drug users there are in the United States.
- Use ADAM data to determine how frequently drugs are used.
- Use ADAM data to determine dosage amounts.

Heroin Consumption Estimates

Estimating consumption of heroin, as with other illicit drugs, poses a myriad of problems that defy the best efforts of researchers to collect data appropriate for meaningful statistical analyses at the national level or to provide a realistic description of the nature and quantity of the narcotics abusing population and the underground markets in which they operate. The data sources noted earlier in this paper represent only bits and pieces of the world of illicit narcotics abuse. These data, while useful subsets, require a number of heroic assumptions, as well as some fairly arbitrary adjustments, when they are used as the basis for deriving national level estimates.

Nevertheless, a number of research efforts have been undertaken using the data sources noted above as well as data from NIDA's Community Epidemiology Working Group (CEWG) and data solicited through interviews with treatment center physicians, law enforcement officials, and even members of the heroin abusing population. Most of these research efforts follow one of two approaches:

- Estimate the number of users and the average quantity of pure heroin (in milligrams) consumed per user per day. The product of these two variables is then multiplied by 365 to arrive at the average quantity of heroin consumed per year.[95]

- Estimate the number of users and the amount of their weekly expenditures on heroin. The product of these two variables is multiplied by 52 (weeks/year) and the result divided by the average retail street price per pure gram of heroin to arrive at the quantity of heroin consumed per year.[96]

While both of these approaches are theoretically sound, both are hampered by inherent weaknesses in the available data and thus require assumptions, which, if altered, would have a substantial impact on the end result. For example, much of the data that are readily available reflect only those drug abusers who have either sought treatment, been arrested, or died of drug related causes. Many drug abusers either do not live in households or are never seen by public health or law enforcement officials and, thus, are not reflected in official statistics on drug abuse. Moreover, the existing data generally reflect the situation in only a relatively few selected urban areas, which may or may not be indicative of the situation at the national level. Thus researchers are forced to assume adjustments to the data based on whatever criteria they deem appropriate. Those assumptions that have a substantial impact on three key variables of the two approaches noted above are discussed below.

[95] *Full Market Model*, *Interagency Heroin Threat Assessment 2000*, and *A Direct Approach to Estimating Heroin Consumption*.
[96] Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs, 1988-2000*.

Assumptions

Number of Users. Estimating the number of heroin users requires researchers to distinguish between hard core addicts (i.e., chronic users) and casual users since both the rates of daily consumption and the expenditures on the drug will differ substantially for each group. The standard approach has been to assume that a chronic user consumes heroin on more than 10 days per month, and anything less than that is considered casual use. Whether this is a reasonable assumption is open to question. For example, TEDS data indicates that of individuals in treatment for heroin abuse in 1996, 83 percent used heroin daily and another 4 percent used between three and six times per week.[97] However the assumption of more than 10 days per month implies that in 1996 only 67 percent of heroin abusers were chronic users, while in 2000, 78 percent were chronic users.[98]

The number of chronic users cited in the most recent studies also depends on an assumption that all chronic drug users have a substantial probability of being arrested. However, many researchers find that most heroin users do not show up in the criminal justice or treatment systems for a substantial period of time, and many never do.[99] In addition, there does not appear to have been an inclusion of persons arrested as juveniles in the arrestee data, although there is clearly a high proportion of drug use among juvenile arrestees.

Rates of Usage. Researchers who rely on estimates of daily rates of usage must necessarily estimate an average use rate that can be applied to chronic users and one that can be applied to casual users. Such rates can be extremely problematic due to substantial variation in the package size and purity of the heroin purchased on the street as well as variation in the tolerance of the user. Some research has found that chronic users also vary their heroin use depending on the time of day, the day of the week, and what other substances are taken with the heroin.[100] According to many epidemiologists, chronic heroin users generally use the drug two to four times per day, although the more heavily addicted use more frequently, particularly at lower purity levels. Moreover, as heroin addiction progresses, addicts develop increasing tolerance for the drug and must take increasingly higher doses or take them more frequently to avoid withdrawal. Withdrawal symptoms generally occur from three to five hours after an addict's last dose.[101] Method of administering the drug can also affect rates of usage. Generally injectors use heroin of lower purity than snorters. Thus, the distribution of these two categories can impact the average rate of usage.

In addition, The data from which to derive average rates of usage come largely from laboratory tests of seized heroin and from treatment center and law enforcement records. These represent a relatively small sample of the total heroin abuse occurring nationwide, and may or may not adequately represent reality.

Price of Heroin. Researchers who estimate heroin consumption based on expenditure of abusers must derive an average price per unit of pure heroin in order to convert total expenditures to total quantities consumed. However, those who have done so have tended to rely on very small samples of price data (e.g., data from six US cities) to extrapolate to the entire nation. Since the price per unit can

---

[97] National Drug Intelligence Center, *Interagency Domestic Heroin Threat Assessment,* Appendix B: Heroin Consumption in the United States, February 2000.

[98] Based on data in Abt study (Table 3) p.9

[99] At least one expert has noted that it generally takes from three to five years for a heroin addict to become visible to health or law enforcement officials.

[100] Agar, Bourgois, French, & Murduch, 1998.

[101] National Drug Intelligence Center, *Interagency Domestic Heroin Threat Assessment,* Appendix B: Heroin Consumption in the United States, February 2000.

vary substantially across geographic areas, as well as with the size of the purchase and the intended method of administration, any given average price may be subject to substantial margin of error. Although the researchers have attempted to adjust prices for the distribution of different methods of administration, it is questionable how stable such data is over time. In addition, the basic price data is often for a year substantially earlier than the one for which the estimate of consumption is being made, and the researchers' only recourse appears to be an adjustment based on the Consumer Price Index, which is certainly not representative of a chronic user's market basket of goods and services.

Even the estimation of what abusers spend per week is subject to considerable uncertainty as the data collected is for expenditures on all drugs, not just heroin. Thus a breakdown of these expenditures by different drug types must be inferred by the researcher, and what this inference is based on is not always made clear. Moreover, drug sales are not always for cash. This presents the problem of estimating the value of different types of income in kind as well as trying to determine how much of total expenditures are represented by income in kind. Determining the degree of uncertainty that such estimates may introduce is a virtual impossibility. In this arena, one could defend almost any number.

Existing Consumption Estimates

Despite the shortcomings in data and assumptions described above, the studies that have been undertaken in recent years have been done in a rigorous and scholarly manner, and while not necessarily definitive of the problem, they are at least indicative of the order of magnitude of the heroin abuse problem in the United States. The tabulation below shows the basic variables and results of three of the more recent US Government or Government sponsored studies of which we are aware.

Table 5 - 5 Heroin Consumption Estimates, 2000

Study	Variables Estimated	(mt of heroin consumed)
Full Market Model[102]	Chronic Users (898,000) Casual Users (253,000) Chronic Use Rate (30mgs/day) Casual Use Rate (15mgs/week)	10.0
What America's Users Spend on Illegal Drugs	Chronic Users (898,000) Casual Users (253,000) Chronic Expenses/week ($201.) Casual Expenses/week ($ 50.) Retail Price/Pure Gram ($839.)	13.3
Interagency Heroin Threat Assessment 2000	Users (980,000)[103] Average Use Rate (50mgs/day)	17.9

[102] Values for chronic and casual users are updated to reflect the most recent version of *What America's Users Spend on Illegal Drugs* (December 2001).

[103] The *Global Heroin Threat to the United States*, July 2000, provides the following explanation for the estimated number of users. For the purpose of providing a reasonable realistic U.S. heroin consumption for this assessment, a conservative estimate of 50 mg per day average dosage of pure heroin was used, calculated for a population of 980,000 hard-core users, of whom 83 percent are believed to use heroin daily. This average daily dosage is substantially less than the likely requirements of many longtime addicts and is an attempt to normalize the full spectrum of users, including the increased number of younger new users whose tolerance levels may still be relatively low. Many analysts and treatment professionals, however, believe that 50 mg as the estimate for average daily dosage for heroin users in the United States underestimates overall U.S. market demand. Consumption by occasional users was also factored into our calculation.

The DEA estimate uses the smallest use rates. These use rates are based on estimating that a "single dose" of street heroin contains 10-20mgs of pure heroin and is taken 1.5 – 1.6 times per day. Both the single dose estimate and the frequency of administration appear to be relatively low as averages for chronic users. DEA's own Domestic Monitor Program (DMP), for example, implies that the average quantity of pure heroin in a "single dose" is 23mgs, and many epidemiologists suggest that chronic users generally consume at least two to four times per day.[104] This implies a minimum consumption rate of 46mgs per day for chronic users. The use rate for casual users in the DEA model implies that such users are consuming only a little over 2mgs per day.

The ONDCP sponsored study derives estimates of what abusers spend on heroin each year and then divides this number by the average retail price per pure gram of street heroin to arrive at a total quantity of heroin consumed. We have already noted some of the problems inherent in the data and assumptions used in this type of estimate, probably the most significant of which is the estimate of the average price per pure gram of heroin. By the researchers' own admission they are *"... especially concerned that the street prices may have been lower than shown ... If that is so, then our estimates for heroin consumption would be too low ..."*.[105] The researchers also point out that if they used the same methodology to derive the average retail unit price for heroin that they used for cocaine, then the heroin price would have been less than half that shown above. Instead, they bifurcated the market into injectors (who pay relatively high unit prices for low quality heroin) and snorters (who pay relatively low unit prices for high quality heroin). They then weight the heroin prices by the market shares of injectors (62%) and snorters (38%), thus obtaining a higher average price than would otherwise be the case. The researchers do note that they are uncomfortable with this adjustment.[106]

The NDIC study concentrates on chronic heroin use and derives an estimated range for average daily use of 46 – 92 milligrams, based on DMP data (i.e. 23mgs of pure heroin in a "single dose") and the epidemiology estimate that chronic users consume from two to four times daily. The researchers then argue that a realistic national average would be 50 mgs per day, and that even this rate is likely to be conservative. Some support for this view can be gleaned from research performed by the Crime and Narcotics Center for 34 countries. This research, *Estimating Narcotics Consumption in Selected Countries,*[107] found that the average daily rate of heroin consumption per user ranged from 60 to 120 mgs of pure heroin during the late 1990s and that the median was about 60-80 mgs. These data may be somewhat biased on the high side however, since they were based on the sample of users that were seen by either law enforcement or health and treatment officials. Most users who either seek help from health facilities or cross the path of law enforcement officials are those who have been using the drug long enough to have built up substantial tolerance levels or developed serious health problems. Such abusers clearly would be using at the higher end of the consumption rate spectrum.

Alternative Consumption Estimates

Given the uncertainty surrounding all of the estimates of heroin consumption, we have set out below some alternative assumptions and results for the three studies noted above. Whether these alternatives are better or worse than those in the original studies is not the issue; only that they are equally plausible and have a substantial impact on the results.

---

[104] NDIC. *Interagency Domestic Heroin Threat Assessment*, Appendix B: Heroin Consumption in the United States. February 2000.
[105] Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs, 1988-2000*, p.18.
[106] Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs, 1988-2000*, p.45.
[107] The report issued in May 2000 is not widely available since it is classified.

In the DEA model, for example, one could easily justify using the 23 mgs "single dose" based on the DMP data and a frequency of use of 2 or 3 times per day for chronic users and once a week for casual users. Such adjustments would yield total annual heroin consumption of 15.4 metric tons vice 10.0 metric tons. Similarly, in the ONDCP sponsored study, for every $100 reduction in the average retail price for heroin, the estimate of annual consumption would increase by 2 – 3 metric tons. Thus, if the retail price of heroin were calculated using the same method that was used for cocaine the price would be halved and the estimate of total consumption would be almost double (i.e. 25 metric tons vice 13.3 metric tons).[108] It is also instructive to note that if the average street-buy in the US were the "dime bag" (i.e. a $10 bag containing an average of 23 mgs of pure heroin), then the average street price per pure gram would be about $435 vice the $839 used in the ONDCP sponsored study, and the annual quantity of heroin consumed would be 26.4 metric tons. Finally, in the NDIC model, a use rate of 40 mgs per day would lower the NDIC consumption estimate to 14.3 metric tons, while a use rate of 60 mgs per day would raise the estimate to 21.5 metric tons. The point is that, given the vagaries of the data, any of these numbers are plausible.

An important data issue in all of these estimates is what the distribution of users looks like in terms of their use rates. Obviously, chronic users are at the higher end of that distribution and, if there are many more chronic users than casual users, the distribution will be skewed toward the high end. Although we cannot know with certainty what the distribution looks like, there is some research that, although dated, suggests use rates for chronic abusers are higher that those included in the DEA model. For example, a study sponsored by ONDCP in 1994 noted that heroin habit size had increased substantially between 1981 and 1992 due to rising purities, falling prices, and increased snorting as the method of administration. The study went on to note that median consumption rate of heroin in New York was 700 mgs of pure heroin per week (100 mgs/day) and that the mean was 972.5 mgs per week (139 mgs/day), while in Chicago the median rate was 280 mgs per week (40 mgs/day) and the mean was 350 mgs per week (50 mgs/day).[109] In addition, a 1998 study of heroin addict habit sizes in San Francisco, Baltimore, and Newark found that the average use rate per day ranged from lows of 14, 62, and 51 milligrams of pure heroin to highs of 224, 258, and 227 milligrams respectively for these three cities.[110] Since heroin prices have continued to fall throughout the 1990s and snorting probably is even more prevalent now than in the early 1990s, it seems unlikely that average habit sizes would have declined. While two cities are not a sufficient sample to extrapolate to the entire country, these data do suggest that average use rates may be higher than commonly believed.

It is also interesting to note that the weekly expenditure data in the ONDCP sponsored study ($201. per week for chronic users and $50. per week for casual users) imply average use rates of 67 milligrams per day of pure heroin for chronic users and 16 milligrams per day of pure heroin for casual users.[111] If we apply these use rates to the number of chronic and casual users in the ONDCP sponsored study, the quantity of heroin consumption would equal 23 metric tons vice 13.3 metric tons. This only illustrates a potential inconsistency between the weekly expenditure data and the average retail price per pure gram used to convert total expenditures to total quantity of heroin consumed. As noted earlier, a lower average retail price per pure gram would yield a higher quantity of heroin consumed.

---

[108] Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs, 1988-2000*, p.45.
[109] ONDCP, *Heroin Users in New York, Chicago, and San Diego*, November, 1994, pp 26-27.
[110] Agar, Bourgois, French, & Murduch, op. cit., pp 922-923.
[111] This assumes that the average street buy is the "dime bag" (a $10. bag containing 23 mgs of pure heroin). For example: $201./$10. = 20.1 bags per week
20.1 bags/7 days = 2.9 bags per day
23 mgs x 2.9 bags = 67 mgs per day

One final alternative estimate is instructive. As noted above, the true distribution of chronic vs. casual users is unknown and the standard definition is to consider those who consume heroin 10 or more days per month as chronic users. Because heroin is highly addictive, most chronic users or addicts will eventually be consuming multiple times per day, as long as the drug is available and they have the wherewithal to acquire it. Thus, it seems likely that true addicts would be consuming considerably more than 10 days per month. This would change the distribution of chronic vs. casual users in the studies cited above, with fewer chronic users and a greater number of casual users among the 1,151,000 total. For example, if the number of chronic users were 600,000 instead of 898,000 and casual users numbered 551,000 instead of 253,000, the total amount spent on heroin in 2000 would be $8.5 billion vs. $11.2 billion, assuming the same average weekly expenditures cited in the ONDCP sponsored study. However, the average weekly expenditures of chronic users likely would be higher since we are now defining a smaller number of more heavily addicted users as chronic. Indeed, even the weekly expenditures of casual users likely would be higher, as this category would now include the influence of expenditures by a portion of those who consume more than 10 days per month. Assuming that these average weekly expenditure numbers turned out to be $210. for chronic users and $60. for casual users (vice $201 and $50 respectively), the total amount spent on heroin in 2000 would now be $9.2 billion. Assuming the average retail price per pure gram was $435., the total quantity of heroin consumed would be 21.1 metric tons. Alternatively, if the average retail price per pure gram were the $839 as cited in the ONDCP sponsored study, the total quantity consumed would be only11.0 metric tons.

Given the foregoing discussion and the available data to date, we believe the most prudent estimate of heroin consumption in the United States should be a range of roughly 14 – 20 metric tons per year. The mid-point of this range (17 metric tons), though not necessarily any more accurate than either of the end-points, does imply an average daily use rate (48 mgs/day) and average retail price per pure gram ($676) well within the error ranges of all the methodologies cited above. Indeed, in any methodology involving multiplicative combinations of estimated variables, each with its own error range, the error range of the end product will be magnified several fold.

Outlook for Refining Consumption Estimates

There is good news and bad news with respect to the outlook for better estimates of heroin consumption. The good news is that data collection efforts are likely to improve as collectors better understand the kinds of information and the extent of coverage needed by researchers engaged in estimating national levels and trends in heroin consumption. Data series, such as ADAM, are already scheduled for improvements that will make estimates based on them more reliable. The bad news is that the resources (read dollars) needed to effect major improvements in data collection and coverage may substantially exceed those that are likely to be available.

Recommendations

Short-Term

Accept, as an interim measure, the range of heroin consumption noted above.

Develop a plan that advocates specific actions to be taken to improve data collection for both methodologies (what users spend & how much they use per day). Approaching the problem from both perspectives will help to identify inconsistencies or consistencies. The plan should also include estimated costs of these efforts both in terms of manpower and dollars, as well as a specific sub-plan to lobby for allocation of the requisite resources to implement the collection plan. Assign a specific agency or create a national level task force to coordinate and monitor the execution of all the individual aspects of the data collection plan.

Long-Term

Assuming the resources are made available, implement the action plan developed in the short term. In addition, efforts should be made to expand the DMP and the Heroin Signature Program to include more samples from a greater variety of sources.

The above recommendations may, at first blush, seem like asking for the moon. However, if we are to seriously address the issue of estimating heroin consumption (or that of other illicit drugs), there can be no substitute for sample data that is truly representative of the using population. When the domain in which the data must be collected is an illicit market, the task of obtaining representative data is both more difficult and more expensive.

Marijuana Consumption Estimates

Assumptions

The estimate of the amount of marijuana consumed in the United States is based upon an ostensibly simple equation: the number of marijuana users in the United States multiplied by the amount of marijuana each user consumes. However, the straightforwardness of this calculation belies the complexity of the overall question to be answered. The data applied to this equation are based upon four key assumptions that are reliable to various degrees. These assumptions are discussed in detail in the remainder of this section.

The Number of Marijuana Users in the United States. Typically, estimates of the number of drug users are based upon consequence indicators (e.g., drug-related treatment admissions, emergency department episodes, mortality data) or on evidence provided by the users themselves (e.g., surveys, voluntary drug tests). In the case of marijuana, the applicability of estimates based upon data from consequence indicators was limited. Many individuals use marijuana frequently and at relatively high dosages without ever entering treatment, visiting an emergency room, or suffering a drug-related fatality. Thus, to base an estimate of the total number of marijuana users on data from consequence indicators likely would provide an inaccurate perspective.

Relying upon information provided by marijuana users themselves may yield a more accurate estimate. However, there are drawbacks to this method of data collection as well. The first potential problem—the difficulty of collecting marijuana use information from a sufficiently broad sampling of users—is mitigated by the existence of the NHSDA. The NHSDA, which derives its information from a representative sampling of individuals throughout the United States, provides an estimate of the number of the nation's marijuana users. Limitations to NHSDA are noted in an earlier section of this paper.

When applying NHSDA data to the question of how many marijuana users reside in the United States another problem arises. The NHSDA reports the number of individuals who have used marijuana 1) at least once in their lifetime, 2) at least once in the past year, and 3) at least once in the past month. In the report, *What America's Users Spend on Illegal Drugs 1988-2000*, only the data provided by those individuals who used marijuana in the past month are employed to estimate the total number of marijuana users in the United States. That is, the data provided by individuals who reported having used marijuana in the past year, but not in the past month, are not used. The implications of this are potentially significant. In 2000, an estimated 10,714,000 individuals used marijuana in the past month, and 18,589,000 used marijuana in the past year. Thus, the amount of marijuana consumed by nearly 8,000,000 users was not factored into the final consumption estimates. The impact of this omission is difficult to gauge. It is reasonable to assume that the majority of the individuals who used marijuana in the past year but not in the past month consume the drug relatively infrequently and in relatively small amounts.

Calculating the Number of Joints Per Month That the Average User Consumes. Relying upon NHSDA estimates to determine how many marijuana users are in the United States ultimately leads to another problem. The object of determining the number of marijuana users is to apply that number to simple calculation: the number of marijuana users in the United States multiplied by the amount of marijuana each user consumes. This calculation is dependent upon the ability to develop an estimate of how much marijuana the average user consumes. This is problematic because individuals use marijuana at varying rates and in unlike quantities. To some extent, NHSDA data reflect these disparate usage patterns, but these nuances are lost when the overall estimate of the number of total users is applied to the calculation mentioned above. For example, in 2000 7.2 percent of 12 to 17 year olds, 13.6 percent of 18 to 25 year olds, and 3.0 percent of individuals over the age of 26 used marijuana in the past month. For the purposes of estimating how much marijuana these individuals consumed, it is necessary to determine whether members of each age group consumed the drug at the same rate: e.g., is it likely that a 12-year old used marijuana as frequently and in the same quantities as a 25-year old?

In spite of this likely disparity, the report *What America's Users Spend on Illegal Drugs 1988-2000* assumes that all marijuana users consume the drug at the same rate and with the same frequency. Thus, one calculation is used to accommodate usage by males and females, adolescents and adults, frequent users and users who tried the drug for the first time in the past month, individuals who use only marijuana and those who use other drugs as well,[112] etc.

The lack of information regarding the number of joints that the average user consumes also poses a problem. The 2000 NHSDA did not address this question; NHSDA stopped questioning users about the number of joints they used in 1994. Because of this information gap, the report *What America's Users Spend on Illegal Drugs 1988-2000* uses the figure reported in 1994 (18.7 joints per month). This assumption is problematic because it fails to reflect usage trends over the past 6 years. The potential for this assumption to have a serious impact on the final marijuana consumption estimate exists but is difficult to quantify. For example, a seemingly dramatic increase in the total number of marijuana users in the United States may prove insignificant in terms of the quantity of the drug consumed if a large portion of that increase represents younger individuals who may use the drug infrequently or in small quantities. However, if these younger users are assumed to consume marijuana at the standard rate of 18.7 joints per month, the impact of this increase will be falsely perceived to be much greater than it is.

The assumption that users continued to consume marijuana at the rate of 18.7 joints per month also is problematic because it does not address in the fact that in recent years the THC *(delta-9 tetrahydrocannabinol*) content of marijuana has increased. The *National Drug Threat Assessment 2002*, prepared by the National Drug Intelligence Center, reports that "potency as characterized by THC content is still increasing. According to data from the Potency Monitoring Project, the THC content of commercial-grade marijuana increased from 1997 to 2000 for commercial-grade (4.25% to 4.92%) and for sinsemilla (11.62% to 13.20%)."[113] Despite this increase, the *National Drug Threat Assessment 2002* states that:

Traffickers in foreign source areas and in the United States supply users with marijuana of varying potency, and while high-grade marijuana appears to receive more publicity, lower potency

---

[112] According to NHSDA data, approximately 59 percent of current illicit drug users consumed only marijuana, and 17 percent used marijuana and another illicit drug in the past month.

[113] The *National Drug Threat Assessment 2002* provides the following explanation of the Potency Monitoring Project. "The Potency Monitoring Project, conducted at the University of Mississippi and funded by the National Institute on Drug Abuse, analyzes samples of marijuana seized by federal agencies."

marijuana—much of which is produced in Mexico—is more endemic. Even in major domestic cultivation areas, large amounts of marijuana produced in Mexico are available.

Given the range of THC content of the marijuana available in the United States, it is likely that the assumption that the average user consumes 18.7 joints per month is not sufficiently representative of the wide range of users it is meant to accommodate.

Calculating the Average Weight of a Joint.. An additional problem results from the focus on marijuana joints in *What America's Users Spend on Illegal Drugs 1988-2000*. In that report, the joint is considered to be a standard measure of consumption. That report estimates that the average joint contains 0.014 (specifically 0.0136 ounces—0.39 grams) of marijuana. However, the amount of marijuana contained in a joint is not fixed.[114] Thus, even if a user consumes a constant number of joints, the amount of marijuana consumed may vary dramatically. In addition, marijuana may be consumed in forms other than the joint (e.g., via a bong or blunt).[115] These other means of consumption are not addressed in *What America's Users Spend on Illegal Drugs 1988-2000*.

Calculating the Average Price of Marijuana Per Ounce. The report *What America's Users Spend on Illegal Drugs 1988-2000* provides an estimated price per ounce for marijuana, but does not provide a detailed discussion regarding the source of this information so it is not possible to assess the reliability of this information. Because this issue is not explained fully it is impossible to determine what, if any, allowances were made for noncash transactions.

Existing Consumption Estimates

Table 5 - 6 Marijuana Consumption Estimates, 2000

Number of Users	10,714,000
Joints Used per Month	18.7
Weight of a Joint	0.0136 ounces
Price per Ounce (1/3 ounce purchase)	$284
Total Annual Expenditure	$9,289,038,000
Total Metric Tons Consumed	927

Source: Office of National Drug Control Policy, 2001. *What America's Users Spend on Illegal Drugs, 1988-2000*.

The estimates in Table 5-6 are based upon the data and calculations provided by the report *What America's Users Spend on Illegal Drugs 1988-2000* prepared by Abt Associates, Inc. The number of users and the total metric tons consumed differ from those presented in *What America's Users Spend on Illegal Drugs 1988-2000* because in that report the number of users in 2000 was based upon a projection. Since that report was prepared, NHSDA released its estimates for 2000 so in the table above the projected number of users was replaced with the actual NHSDA estimates.

The series of calculations used to arrive at the total metric tons consumed follows.

[114] The 1997 NNICC prepared by the Drug Enforcement Administration states that a joint contains one-half gram [of marijuana] on average…" This information was included in *What America's Users Spend on Illegal Drugs 1988-2000.*

[115] According to the 1997 NNICC, a blunt may contain as much as 6 times [the amount of marijuana contained in a joint]. This information was included in *What America's Users Spend on Illegal Drugs 1988-2000.*

- The average user consumes 18.7 marijuana joints per month; each joint contains 0.0136 ounces of marijuana. [18.7 x 0.0136 = 0.25432 ounces (the amount of marijuana that the average user consumes each month)]

- The average user consumes 0.25432 ounces of marijuana per month; the price per ounce for marijuana (for a 1/3-ounce purchase) is $284. [0.25432 ounces x $284 = $72.23 (the amount the average user spends on marijuana each month)]

- The average user spends $72.23 per month on marijuana. [$72.23 x 12 months = $867 (the amount the average user spends on marijuana each year)]

- The average user spends $867 on marijuana per year; the NHSDA estimates that there are 10,714,000 people in the United States who have used marijuana in the past month. [$867 x 10,714,000 = $9,289,038,000 (the annual estimated expenditure for marijuana in the United States)]

- The annual estimated expenditure for marijuana in the United States is $9,289,038,000; the price per ounce for marijuana (for a 1/3-ounce purchase) is $284. [$9,289,038,000 / $284 = 32,707,880 ounces (the amount of marijuana—in ounces—consumed annually in the United States)]

- Converted to metric tons: 32,707,880 ounces = 927 total metric tons consumed annually in the United States.

The result of the above calculations—that 927 metric tons of marijuana were consumed in the United States in 2000—must be regarded with some skepticism when marijuana seizure data for 2000 are acknowledged. According to the Federal-wide Drug Seizure System, in 2000, approximately 1,200 metric tons of marijuana were seized in the United States, and a large portion of the seized marijuana was from foreign sources.[116] Thus, according to these estimates the amount of marijuana seized exceeded the amount of marijuana consumed in the United States. Abt Associates, Inc., the preparers of *What America's Users Spend on Illegal Drugs 1988-2000* the report upon which this document relies heavily, offer one explanation for the fact that marijuana seizures exceed the final consumption estimate.

There may be a measurement problem. That is, the tonnage from seizures may include nonsalable bulk, and thus, seizures may overstate the consumption-equivalent of marijuana seized at the border.

However, the authors acknowledge that this argument does not adequately explain the disparity between the amount of marijuana seized and the amount consumed.

> …it seems unlikely that marijuana growers would continue to export into the United States when the probability of detection and seizure of product was as high as is implied by the combination of the consumption and seizure estimates.

Alternative Consumption Estimates

It is likely that the estimate of marijuana consumption detailed above (927 MT) is too low.[117] There are various reasons that this may be the case, many of which are discussed in detail in the

[116] Marijuana seizure information is taken from the *National Drug Threat Assessment 2002* prepared by the National Drug Intelligence Center.

[117] The marijuana consumption estimate provided in *What America's Users Spend on Illegal Drugs 1988-2000* is somewhat higher than the figure calculated here (1,047 metric tons compared with 927 metric tons). While the

Assumptions portion of this section. The failure to include the nearly 8 million individuals who used marijuana in the past year (but not in the past month) probably has resulted in a much lower final consumption estimate. If the amount of marijuana consumed each year by these past year users is factored in, it raises the overall marijuana consumption estimate to 957 MT.[118] If allowances are made for the approximately 2 percent of the general population not captured by the NHSDA, and if these are assumed to be all past-month users of marijuana, the overall estimate is raised another 18 MT for a new total of 975 MT.[119] The marijuana consumption estimates yielded by these calculations are likely still underestimates, in part because the NHSDA data upon which the estimates are based rely on information self-reported by users themselves. This may render the estimates considerably lower as users likely underreport the amount of marijuana they consume.

The *Full Market Model* provides a much higher, alternative estimate for the amount of marijuana consumed in the United States. DEA's Statistical Services Section yielded a marijuana consumption estimate of 4,270 metric tons for 2000.[120]

Outlook for Refining Consumption Estimates

The primary obstacle to developing a reliable estimate of the amount of marijuana consumed in the United States results from the limitations and constraints of the data upon which the estimate is based. Thus, these supporting data must become more comprehensive, relevant, and meaningful for the accuracy and reliability of the overall estimate to improve. The outlook for this endeavor is promising as data collection agencies develop more rigorous methods and a more inclusive scope.

NHSDA data will remain a key component of the marijuana consumption estimate calculation. No other survey offers the resources or coverage that the NHSDA provides. Furthermore, NHSDA researchers have already implemented changes that will render the data it provides more immediately applicable to this project. For example, the implementation of computer-assisted interviewing ensures an increased sense of privacy and (likely) a greater degree of accuracy with regard to the information the respondents provide. In addition, the 2001 iteration of the NHSDA supplies new information about marijuana markets, including data regarding prices and quantities consumed. This information will prove essential to developing more accurate consumption estimates.

Marijuana market information now may supplemented by data gathered and analyzed as part of the Arrestee Drug Abuse Monitoring Program (ADAM). Recent reports produced by ADAM provide

---

higher figure may be closer to the actual amount consumed in the United States, it should not be assumed to be more accurate. Abt Associates, Inc. arrived at the figure of 1,047 metric tons because the NHSDA user data were not available for 2000 at the time of publication of their report. Thus, their estimated number of past month users was based on the projection that the number of users would increase from 11.9 million in 1999 to 12.1 million in 2000. In fact, the estimated number of past marijuana users as reported by NHSDA in 2000 was approximately 10.7 million.

[118] According to NHSDA data, in 2000, an estimated 18,589,000 individuals used marijuana in the past year. Of these users, 10,714,000 reported past month use. Thus, the remaining 7,875,000 past year users represent the group being discussed here. For the purposes of this calculation, these past year users were assumed to have consumed an average of 10 marijuana joints during the past year. When these values (number of users and amount of marijuana consumed) were applied to the calculation described above (Section 3.3.2), the result was 30.36 MT. This figure has been added to the previous estimate of 927 MT.

[119] For purposes of this calculation, this subpopulation missed by the NHSDA are assumed to have consumed marijuana at the rate of past month users.

[120] The *Full Market Model* incorporates the following drug use-related data sets and corresponding demand indicators: National Household Survey on Drug Abuse, Monitoring the Future study, Arrestee Drug Abuse Monitoring Program, Drug Abuse Warning Network, Treatment Episode Data Set.

detailed information about marijuana purchases by arrestees in ADAM sites throughout the United States.

Recommendations

The two most critical components of the marijuana consumption estimate calculation are 1) the number of users in the United States and 2) how much marijuana these users consume. Thus, these are the two subject areas in which data refinement is most essential. Since the marijuana consumption estimates produced in the report *What America's Users Spend on Illegal Drugs 1988-2000* and in this document are low, it is likely that the number of users and/or the amount of marijuana these users consume was underestimated.

Estimated Number of Users

- Include the nearly 8 million individuals who used marijuana in the past year but not in the past month.
- Continue to implement strategies designed to elicit truthful, accurate information from marijuana users.
- Undertake additional research to determine how to account for possibly untruthful or inaccurate information provided by marijuana users.

Amount of Marijuana Consumed

- Examine the role of increasing THC content.
- Conduct research to determine whether existing estimates of marijuana usage remain accurate.
- Undertake further research to develop formulas that accommodate different users' rates of usage.
- Undertake further research to determine the impact of using marijuana in different forms (e.g., joints, blunts, bongs).
- Determine the extent to which noncash transactions influence the estimates of marijuana prices.

Methamphetamine Consumption Estimates.

Methamphetamine abuse is now seen as a major problem in the U.S. However, the best estimates on this issue suffer from considerable imprecision. All of the methamphetamine consumption estimates below are best treated as having wide (but unknowable) confidence intervals. These estimates for are based on analyses of mostly TEDS, DUF, and STRIDE data. This analytic work was conducted by Abt Associates and was published in *What America's Users Spend on Illegal Drugs, 1988-2000* (Office of National Drug Control Policy, 2001b). The most recent data, based on Abt research, suggests that in 2000 about 600,000 hardcore methamphetamine users exist in the U.S., and they consumed about 20 metric tons of methamphetamine at the cost of about $5.4 billion (in 2000). Also, the number of methamphetamine users and expenditures on methamphetamine has increased over the past decade.

Assumptions

Very little methamphetamine use is found in the general population and in schools. Therefore, the NHSDA and MTF are not particularly useful for estimating methamphetamine use. Researchers have come to rely on using more specialized populations to arrive at estimates of methamphetamine use. One

approach is to use DUF data. When applied to methamphetamine, the approach does not work very well. Estimates using DUF are problematic for two reasons. The first is that methamphetamine use is rare among arrestees in many cities, so the estimates are really based on the experiences of a few cities, and those experiences are then prorated across the nation. The fact that so few cities account for the estimates may impart additional uncertainty to the calculation. The second reason for skepticism is that the DUF methamphetamine use estimates vary markedly from year to year.

The other approach is to use TEDS data. In a study for ONDCP, Abt used TEDS data to estimate the number of chronic methamphetamine users. The first problem with relying on TEDS data are that some of those who were diagnosed as needing treatment for methamphetamine said they did not use methamphetamine in the last month. Abt argued that such users are probably not chronic users and excluded them from the calculations. The second problem arises when one substance abuse provider referred clients to another provider. If these referrals were for a continuum of care, they would amount to double counting, so Abt excluded such cases from the analysis. A third problem is that TEDS under-represents treatment admissions. In 1998 TEDS included about 83 percent of all TEDS-eligible admissions and about 67 percent of all treatment admissions. (A "TEDS eligible admission" is an admission to a program that receives public funding.) To adjust for under-counting, Abt took the average of the two under-count estimates (1 divided by 0.67 and 1 divided by 0.83). A fourth problem is that the TEDS public release data combines treatment for methamphetamine with treatment for other stimulants. Abt assumed that methamphetamine accounted for about 79 percent of treatment admissions where stimulants were identified as the primary substance of abuse, so Abt adjusted their estimates by multiplying them by 0.79.

Existing Consumption Estimates

Table 5 - 7 Summary of Abt study for ONDCP - 1998 Estimates

Items	Number & Source	Assumptions
Number of users (general assumptions)	NA	3/4 of all users are chronic; 1/4 occasional
Rate of users entering treatment	TEDS	limitations to TEDS data (data does not capture all admissions; includes other stimulants, etc.)
Number of chronic users Median weekly expenditure	669,000 (TEDS) $173 (DUF)	assumes that chronic users seek treatment when used to calculate annual expenditures it is multiplied by 4/3 to account for occasional users, original 1995 base projection relies on 1995 Six City DUF Drug Market Study
Price per pure gram	$294	relies partly on DEA STRIDE data
Total expenditures	$8.0 billion	
Total amount consumed	27.2 MT	

Abt used TEDS data to estimate the number of chronic methamphetamine users. Abt first estimated the rate at which chronic methamphetamine users entered substance abuse treatment during 1998, the most recent year of TEDS data. Abt started with the total number of adults who entered treatment during 1998 and for whom methamphetamine was diagnosed as the primary or secondary drug of abuse. Abt divided the data into Metropolitan statistical areas, computed the number who entered treatment in each MSA, estimated the rate at which chronic users entered treatment in each MSA, and divided the former by the latter to estimate the number of chronic drug users in each MSA. The national estimate was the sum of the estimates across the MSAs with some adjustments (see below section on "assumptions"). Abt estimated that about 670,000 Americans use methamphetamine at a level sufficient that a clinician would deem them to need treatment.

Unfortunately, Abt has not thoroughly test the sensitivity of this estimate to alternative assumptions. Also, this single point-estimate of 670,000 for 1998 does not provide any information about earlier and later years. To get that information Abt did an overlay of the 670,000 estimate on trend estimates based on the DUF data after subtracting for chronic users incarcerated in prisons and smoothing over three-year periods (see Abt report page 23 for trend data)

After arriving at an estimate for the number of chronic methamphetamine users, Abt proceeded to calculate estimates for total expenditures for methamphetamine (based on weekly expenditures and price per pure gram data) and amount of methamphetamine consumed/purchased in metric tons. To provide an estimate of total expenditures for methamphetamine, Abt had to first calculate numbers for weekly expenditures and price per pure gram of methamphetamine. Estimates of weekly expenditure on methamphetamine are uncertain because the data are sparse. In the absence of hard data, Abt assumed that chronic users of methamphetamine spent about $200 per week in 1995. Abt's reasoning was that expenditures by chronic methamphetamine users are probably comparable to expenditures by chronic cocaine and heroin users, and chronic heroin and cocaine users spend about $200 per week. The estimate of total revenue comes from multiplying the number of chronic users by their weekly expenditure, and then multiplying by 52 to determine a yearly expenditure. The result was multiplied by 4/3 (the reciprocal of 0.75) to account for occasional users. Abt estimates that in 1999 methamphetamine users spent somewhat less than $6 billion per year on methamphetamine use. The next step was to estimate the price of methamphetamine. The final step is to divide total revenue by the price per pure gram. If casual users account for roughly 25 percent of consumption, the 1999 estimate is roughly 18 metric tons.

There is scant evidence to support any secondary check on these calculations. According to the TEDS data, 15 to 18 percent of treatment admissions between 1993 and 1998 identified cocaine as the primary drug of abuse. Methamphetamine was the primary drug for between 1.3 percent (1993) and 3.6 percent (1998) of admissions. If we take the 1998 numbers to imply that there were 4.1 chronic cocaine users for every 1 chronic methamphetamine user, and if we accept the earlier estimates of the number of chronic cocaine users, then there would be about 680,000 chronic methamphetamine users during 1998. That agrees closely with the estimate reported above, but this assumption of proportionality is tenuous. If we take the 1993 numbers to imply that there were roughly 13.5 chronic cocaine users for every chronic methamphetamine user, and if we again use the earlier estimates of chronic cocaine users, we would say there are about 230,000 chronic methamphetamine users in 1993.

Alternative Consumption Estimates.

One alternative to the TEDS-based estimate for estimating chronic/hardcore methamphetamine use comes from the Drug Use Forecasting data set (now called ADAM). To calculate methamphetamine estimates based on DUF data, Abt applied the same computing algorithms used to derive estimate for cocaine and heroin. According to Abt's calculations, for 1998 there are about 300,000 hardcore users of methamphetamine (defined as using more than ten days per month). Combining the DUF data from all

years, hardcore methamphetamine users spend about $90 per week on their use of methamphetamines. The estimate of total revenue comes from multiplying the number of hardcore users by their weekly expenditure, and then multiplying by 52 to determine a yearly expenditure. The result was multiplied by 4/3 (the reciprocal of 0.75) to account for occasional users. Methamphetamine users currently spend somewhat more than $2 billion per year on methamphetamine use. The next step was to estimate the price of methamphetamine. The final step is to divide total revenue by the price per pure gram. If casual users account for roughly 25 percent of consumption, the estimate is 9 to 16 metric tons.

Outlook for Refining Consumption Estimates

The ability to improve estimates of the quantity of methamphetamine used ultimately depends on obtaining data from methamphetamine users. These data, however, are not now obtained and would probably be difficult to obtain because methamphetamine users themselves reliably know neither how much they consume nor the purity of the methamphetamine they ingest.

Given that the data for reasonably accurate estimates is difficult to obtain, there are refinements that could be made with the existing data. This section focuses on TEDS as it is used in the methamphetamine estimates in *What America's Users Spend on Illegal Drugs 1988-2000* (pages 20-23).

At the end of the second paragraph on page 20, the authors note that "the estimates vary markedly from year to year." There are now a sufficient number of years of TEDS data that an averaging should give estimates that vary markedly less. On page 22 in the last paragraph, the authors use TEDS data for two years, 1993 and 1998. Using more years of data would improve the estimates.

In the next paragraph on page 20 the authors use the TEDS data to estimate the number of "chronic methamphetamine users." Their estimate makes use of the rate at which methamphetamine users entered substance abuse treatment. Their estimate could be refined if they analyzed the TEDS data by whether or not the methamphetamine users were being admitted to treatment for the first time or had previous treatment admissions.

In the second paragraph of page 21 the authors point out that TEDS under-represents treatment admissions. The adjustments to account for under-representation could be improved by using more up-to-date data on the extent to which TEDS represents the universe of treatment facilities.

The TEDS is an important source of information in the modeling done by the authors, but they do not utilize the data set as effectively as they could. A re-analysis of the TEDS would help to refine the estimates.

Recommendations

Short-Term. The prior section offers several ways in which the estimates could be improved. If the short-term is considered as the next year, perhaps the most important recommendation is to improve the estimates with existing data. A second recommendation is to obtain better information on how much is ingested on average and how frequently. Clinicians who treat methamphetamine users would be able to offer such anecdotal information. Although anecdotal information is not representative of all users in the country, it should help to improve the estimates.

Long-Term. In the next few years, it is recommended that new data sources be obtained for methamphetamine and other drugs. This will require additional federal spending, of course. In the absence of this new data, the estimates will continue to be difficult to defend.

Conclusions And Recommendations

While consumption estimates for the four illicit drugs of interest exist, it must be noted that these are extremely sensitive to any alterations in the assumptions that underlie the calculations. The effect of adjustments on the underlying components of the estimates can be large and multiplicative, as illustrated above. Ultimately, the solution to more reliable consumption estimates rests in a better data infrastructure.

There are several key questions with less than adequate answers at this time, such as:

- How many chronic users of each drug are there in the United States?
- What are the dose sizes and dosing patterns various user types?
- How does one monitor the purity of various drugs?
- What is the value of both cash and non-cash transactions to obtain drugs?

Short-Term Improvements

In the short-term, there are data improvements in the horizon that we expect will lead to improved consumption estimates. Two examples rest with the NHSDA and with ADAM.

NHSDA in 2001 includes, for the first time, information on the market dynamics of marijuana. Since marijuana is the most commonly used illicit drug, and since the NHSDA provides relatively good population coverage on marijuana, this is a substantial improvement in the components of marijuana consumption estimation.

The prospects of ADAM's expansion into a system that will permit national estimates bode well for the enhancement of drug consumption estimates. As reported in the Office of Justice Program's budget submission for 2003, an additional $4 million in FY 2003 is expected to bring the program to 60 sites, on the way to "NIJ's ultimate goal of expanding ADAM to a total of 75 sites in order to collect drug data at the national level" (ONDCP FY 2003 Drug Budget Summary, p. 129). However, the Working Group is concerned that the ADAM program now appears to be at a standstill at 35 sites, which is a far cry from the national estimates. If the ADAM program expansion is derailed, then it represents a major step backward in our ability to reliably estimate drug consumption numbers.

These two examples show how specific enhancements in existing data systems can potentially improve consumption estimates in the immediate future. To augment these, the Working Group also recommends immediate studies of a limited scope that could begin to address some of the questions posed above. For example, in the near term under the aegis of policy research, a comprehensive review of the scientific literature might be undertaken to examine dose sizes and dosing patterns of heroin, cocaine, marijuana, or methamphetamine users. If it is found that little reliable or valid information exists, this could form the basis of identifying research questions that can be channeled to drug agencies with a research mandate, such as NIDA.

Long-Term Improvements

In the long-term, there is a need for an explicit data plan and infrastructure to support valid and reliable estimation of illicit drug consumption on a regular and timely basis. Some elements of this already exist, what is required is a definitive focus on this particular estimation task. For example, ONDCP's Advisory Committee structure has an inter-agency Subcommittee on Data, Research and Interagency Coordination. One of the major tasks of this Subcommittee is to "convene a forum on

integrating information and drug control policy" (Office of National Drug Control Policy, 1999). As an already ongoing interagency effort, this Subcommittee can potentially be harnessed to address specific issues relating to consumption estimation, since all the agencies generate data needed are represented. The Drug Flow Models Steering Committee might consider the Subcommittee among its options for institutionalizing the exploratory work that is being undertaking by the various working groups.

The longer horizon also has to consider the estimation of drug consumption in the context of a broader drug policy research agenda. As part of a comprehensive review of policy research needs, the National Research Council (NRC) was commissioned by ONDCP to;

1. assess existing data sources and recent research studies that support policy analysis;
2. identify new data and research that may enable the development of more effective means of evaluating the consequences of alternative drug control policies; and
3. explore ways to integrate theory and findings from diverse disciplines to increase understanding of drug abuse and the operation of drug markets. (National Research Council, 2001).

Many of the recommendations by the NRC are pertinent to the estimation of drug consumption. The NRC Committee asserts that "consumption data are critical to assess the responsiveness of drug use to enforcement" and "recommends that work be started to develop methods for acquiring consumption data" (National Research Council, 2001, p. 3). This area of research is in its infancy. The Working Group recommends that, in the Steering Committee's efforts to advance the science of consumption estimation, that a systematic review and consideration the findings from this report be undertaken to inform the future Working Group efforts.

Appendix 5-A - What America's Users Spend on Illegal Drugs 1988-2000

[page 9 excerpt]

Other policy analysts have reported their own estimates, and these can be compared with our estimates. For example, Rhodes, Langenbahn, Kling and Scheiman provided one national estimate of 508,000 chronic heroin users, and a second national estimate of 582,000 chronic heroin users. The authors explain why both estimates probably understate the true number. We are aware of only one other national estimate of heroin addicts, by Hamill and Cooley, who concluded there were 640,000 to 1.1 million heroin addicts in 1987. The higher estimate is consistent with our 1988 estimate of over one million chronic heroin users.

Table 3 - Estimated Number of Chronic an Occasional Users of Cocaine and Heroin (Thousands), 1988-2000

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NHSDA [1]													
Cocaine Chronic	1,100	980	850	806	829	615	734	582	608	682	595	595	537
Cocaine Occasional	6,000	5,300	4,600	4,478	3,503	3,332	2,930	3,082	3,425	3,487	3,216	3,216	3,035
Heroin Occasional	170	150	140	359	304	230	281	428	455	597	253	253	253
DUF [2]													
Cocaine Chronic	3,434	3,334	3,133	2,976	2,854	2,773	2,665	2,575	2,524	2,506	2,502	2,457	2,436
Heroin Chronic	1,341	1,266	1,119	1,015	955	945	932	923	910	904	901	898	898
Composite													
Cocaine Occasional	6,000	5,300	4,600	4,478	3,503	3,332	2,930	3,082	3,425	3,487	3,216	3,216	3,035
Heroin Occasional	170	150	140	359	304	230	281	428	455	597	253	253	253
Cocaine Chronic [2]	3,984	3,824	3,558	3,379	3,269	3,081	3,032	2,866	2,828	2,847	2,800	2,755	2,707
Heroin Chronic	1,341	1,266	1,119	1,015	955	945	932	923	910	904	901	898	898

Columns may not add due to rounding. Estimates for 2000 are projections
Sources: NHSDA 1988, 1990 through 1999; DUF 1988 through 1999; Uniform Crime Reports (UCR) 1988 through 1999.

[1] The NHSDA was not administered in 1989. Estimates are the averages for 1988 and 1990.
[2] Due to sample overlap, the estimated number of composite chronic cocaine users is derived from the sum of DUF chronic cocaine users and one half of NHSDA chronic cocaine users.

Simeone, Rhodes, Hunt and Truitt (SRHT) estimated that there were about 300,000 chronic cocaine/heroin users in Cook County in 1995. Assuming a constant proportionality between the number of chronic users in a population and the number of emergency room admissions attributed to them, an extension of the SRHT estimates suggest there are about 3.75 to 4.25 million chronic users in the nation. Although such an

[page 19 excerpt]

Other studies provide comparable estimates. Using a much different estimation methodology, Rand researchers estimated that about 451 metric tons of cocaine entered the United States in 1989. This

compares with our estimates of 447 metric tons in 1990. The Rand researchers estimate that 7.8 metric tons of heroin entered the States in 1991; our estimate is 12.5 metric tons.

We have made major changes to methods used to estimate retail-level prices for cocaine, and as a result, our new price series is lower than our previous price series. The largest differences occur during the earlier part of the time-series. As noted before, current expenditure estimates for cocaine are lower than previous estimates, but lower cocaine prices partly offset what otherwise would be a decrease in total cocaine use. We now estimate much higher cocaine use for 1988 through 1990, but for reasons already explained, we heavily discount the accuracy of estimates for 1988 and 1989 and distrust estimates for 1990.

We also made major changes to the method of estimating heroin prices but are skeptical that even these new estimates truly reflect retail-level market prices. The principal problem is that the retail market seems to be bifurcated between consumers who pay relatively low unit prices for high quality heroin suitable for inhalation and consumers who pay comparatively high unit prices for low quality heroin suitable only for injection. The larger the proportion of the market devoted to high quality heroin, the lower the average price; likewise, the larger the proportion devoted to low quality heroin, the higher the average price. We cannot tell the mix between high quality and low quality purchases; hence, we remain uncertain about how much users typically pay for their heroin. Table 6 reflects a working estimate.

Table 6 - Retail Prices Per Pure Gram for Cocaine and Heroin, 1988-2000 (dollars, 2000 dollar equivalents)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cocaine	$180	$170	$174	$178	$160	$151	$147	$139	$144	$140	$145	$146	$152
Heroin	$2,184	$1,758	$1,968	$1,914	$1,697	$1,403	$1,374	$1,222	$1,109	$1,080	$851	$783	$839

Estimates for 2000 are projections
Source: STRIDE 1981 through 2000

Table 7 - Total Amount of Cocaine and Heroin Consumed, 1988-2000 (in metric tons)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cocaine	660	576	447	355	346	331	323	321	301	275	267	271	259
Heroin	14.6	16.6	13.6	12.5	11.7	11.2	10.8	12.0	12.8	11.8	14.5	14.3	13.3

Estimates for 2000 are projections
Sources: See Tables 3 through 6.

[page 23 excerpt]

methamphetamine users in 1993, fewer than what we report in the table. Perhaps there is some comfort here that the scale is about right, but precision is elusive.

Assuming the scale is about right, what can be said about the trend? The TEDS data show an increase in admissions with methamphetamine named as the primary drug of abuse. Just 1.0 percent of admissions in 1992 and 1.3 percent of admissions in 1993 were for methamphetamine. This compares with 3.5 percent in 1997 and 3.6 percent in 1998. We see those trends reflected in Table 8.

As another check on trends, reports from the Community Epidemiology Work Group provide a somewhat inconsistent picture from one report to the next. During the last three years, the CEWG has reported that methamphetamine use has decrease and then increased. Our trend statistics show the opposite. However, our choice to smooth the estimates masks the fact that our estimates vary markedly from year-to-year. We doubt that we have captured the short-term trend during the late 1990s. On the other hand, we have

no reasons to doubt the long-term trend during the decade, which is consistent with treatment admission data and other sources.

Table 8 - Calculation of Total Methamphetamine Consumption, 1989-2000

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Chronic Users	274	269	259	270	302	381	474	584	664	707	669	617	595
Median weekly expenditure	$327	$311	$319	$196	$229	$194	$232	$226	$220	$189	$173	$136	$132
Price per pure	273	307	358	369	352	271	223	169	187	262	294	316	276
Total expenditures (billions)	$6.2	$5.8	$5.7	$3.7	$4.8	$5.1	$7.6	$9.2	$10.1	$9.3	$8.0	$5.8	$5.4
Metric tons	22.7	19.0	16.1	10.0	13.6	18.9	34.1	54.2	54.3	35.3	27.2	18.3	19.7

Estimates for 2000 are projections
Sources: NHSDA 1988, 1990 - 1999; STRIDE 1981 - 2000; DUF 1989-1999; Uniform Crime Reports 1988-1999; TEDS 1998

Marijuana

In this section, we estimate the dollar value of marijuana consumption by multiplying the following factors: number of users in the past month, by the average number of joints used in the past month, by the average weight per joint, by the cost per ounce. Calculations are summarized in Table 9

[page 26 excerpt]

Table 9 - Calculation of Total Marijuana Consumption, 1988-2000

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Number of Users (millions)	11.6	10.9	10.2	10.4	9.7	9.6	10.1	9.8	10.1	11.1	11.0	11.9	12.1
Joints used per month	16.9	17.3	17.6	16.6	17.2	17.8	18.7	18.7	18.7	18.7	18.7	18.7	18.7
Weight of a joint (ounces)	0.0134	0.0135	0.0137	0.0135	0.0134	0.0136	0.0136	0.0136	0.0136	0.0136	0.0136	0.0136	0.0136
Price per ounce, 1/3 ounce purchase	$385	$361	$508	$499	$545	$432	$397	$340	$309	$311	$322	$292	$284
Total expenditure for the year ($ in billion dollar equivalents)	$12.1	$11.0	$15.0	$14.0	$14.6	$12.0	$12.2	$10.2	$9.5	$10.5	$10.8	$10.6	$10.5
Metric Tons	894	866	837	793	761	791	874	848	874	960	952	1028	1047

Estimates for 2000 are projections

Sources: NHSDA 1988, 1990 through 1999; STRIDE 1981 through 2000.

Appendix 5-B - Memorandum

Subject	Date
Status Report on Efforts to Develop Estimates of the Availability of Illicit Drugs for U.S. Consumption	12-19-2001

To	From
Martin W. Pracht, Chief Executive Policy and Strategic Planning Staff	Dr. Patrick R. Gartin, Chief Statistical Services Section

The purpose of this memo is to provide a status report on the efforts by the Statistical Services Section (ADSA) to develop estimates of the availability of illicit drugs for U.S. consumption. Developing national estimates for cocaine, heroin, methamphetamine and marijuana availability is a complex and difficult endeavor, largely due to data limitations. However, although there are broad information gaps due to lack of pertinent data, and serious concerns regarding the validity of much of the data that is available, there is much that can be discerned about drug availability from existing data sources. Whereas most efforts to address this problem have generally focused on either the supply side or the demand side of the equation, we have utilized both supply and demand data in the development of what we refer to as Full Market Models. Below, we describe our efforts to arrive at, first, supply side drug availability estimates and, second, demand side consumption estimates.

Supply Side Availability Estimates

Several sources were consulted in our efforts to develop supply side estimates of drug availability, including:

1) United Nations Office for Drug Control and Crime Prevention (UNDCP);
2) Office of National Drug Control Policy (ONIDCP);
3) State Department's International Narcotics Control Strategy Report (INCSR);
4) National Drug Intelligence Center (NDIC);
5) El Paso Intelligence Center (EPIC);
6) CIA's Crime and Narcotics Center (CNC);
7) Defense Intelligence Agency (DIA);
8) DEA's Intelligence Division;
9) Federal Wide Drug Seizure System (FDSS);
10) Domestic Cannabis Eradication Program (DCEP); and
11) State and Local law enforcement agencies

Using data provided by the sources listed above, and in consultation with representatives from the respective agencies, drug-specific full market models were developed to estimate the availability of cocaine, heroin, methamphetamine and marijuana to U.S. consumers (see Attachments 1-4). From cultivation to consumption, individual market components were identified and attempts were made to quantify each component with relevant data. For example, the foreign cultivation, net foreign produce, and arrival zone seizure components of the full market marijuana model were assigned values based on data obtained from INCSR, NDIC, and EPIC, respectively. Where possible, estimates were derived for individual components based on either direct or indirect indicators. Internal data and published statistics were the primary types of direct indicators. For example, domestic seizure figures obtained through FDSS, estimates of eradication of domestic marijuana cultivation issued by DCEP, and production estimates published in INCSR are direct indicators used in the marijuana model. When direct indicators

were unavailable, indirect indicators were derived based on assumptions or mathematical computations that used estimates from other components within the model. For example, although no direct indicators for total marijuana cultivation were identified, an indirect indicator was produced for the model by adding together the foreign marijuana cultivation and the domestic marijuana cultivation figures.

While we present what we consider our best effort to produce supply side estimates of drug availability, there are caveats that should be taken into consideration when assessing our models. First, there are several model components that could not be quantified due to lack of relevant data, thus rendering our models less than complete. Second, representatives from many of the agencies that were consulted in this effort have expressed grave concerns that issues of data quality make the validity of our estimates questionable at best. Although we agree that the state of available data is far from ideal, we strongly disagree with the stance taken by others that this should preclude efforts such as the one we have undertaken. Developing and discussing an imperfect assessment that future efforts may improve upon is far more useful than taking the position that we can't possibly know for sure how many drugs are available, and should thus not attempt to develop estimates for fear that they will be wrong.

Demand Side Consumption Estimates

A variety of data sources exist that shed light on U.S. illicit drug consumption (see Attachment 5 for a description of major indicators). As with the supply side models, we consulted with and utilized information from several sources to develop our demand side consumption estimates, including:

- Substance Abuse and Mental Health Services Administration (SAMHSA):
  a) National Household Survey on Drug Abuse (NHSDA);
  b) Drug Abuse Warning Network (DAWN);
  c) Treatment Episode Data Set (TEDS);
  d) Center for Substance Abuse Prevention (CSAP);
  e) Center for Substance Abuse Treatment (CSAT);

- NIJ's Arrestee Drug Abuse Monitoring (ADAM) program;ONDCP; and

- National Institute for Drug Abuse (NIDA)'s Monitoring the Future Survey

Two approaches to developing demand side consumption estimates were taken, both of which applied a methodology similar to that used in the ONDCP funded report by Abt Associates entitled What America's Users Spend on Illegal Drugs. The first approach involved modifying the estimates derived in the ONDCP report cited above. This was accomplished by first obtaining from the authors of the report the estimates they used for hardcore vs. occasional users, dosage, purchases, and uses per day. Based on a variety of factors, adjustments were made to these estimates (e.g., altering dosage amounts) and a revised national consumption estimate for each drug category was produced by multiplying, for hardcore and occasional users separately, the number of users by both the dosage of drug used and the frequency of use, then adding these sub-estimates together. Both the original ONDCP estimates and our modified national consumption estimates can be found in Attachment 6.

The second approach that we took involved attempting to develop what is referred to as a synthetic estimation model. Basically, this involves combining data that apply to various sub-groups of a population in an attempt to develop estimates in the absence of a single data source that applies to the entire population. For example, the ADAM data provide valuable information on drug use, but only for arrestees. Similarly, the TEDS only provides insight into the drug use of those in treatment. Finally, household surveys have been widely criticized for failing to include those who are at greatest risk for drug use, such as persons who are criminally active or in treatment. Given these limitations of the available

data, we proposed disaggregating the drug user population into three sub-populations: (1) those individuals who indicated on the NHSDA that they had used illicit drugs but had neither been treated nor arrested; (2) those individuals that are identified in the TEDS as illicit drug users admitted to a State treatment facility but who have not been arrested; and finally, (3) those individuals that are identified in the ADAM data as arrestees who tested positive for illicit drug use. Combined, the estimates developed from the NHSDA, TEDS, and ADAM data for these three sub-populations could be used to generate a national synthetic estimate for the number of illicit drug users that would likely exceed the accuracy of the gross estimate produced by the first approach discussed above. Including such an estimate in an equation with the dosage amount and frequency of use would represent a sophisticated and comprehensive approach to determining the amount of illicit drug consumption in the U.S.

Unfortunately, two problems have hindered our efforts to develop a national synthetic estimation model as described above. First, although the NIISDA is based on a national sample and the TEDS represents data from across the country, currently available ADAM data do not represent national coverage, and thus cannot be used to develop a national estimate. Fortunately, however, a sampling plan was instituted last year for the ADAM program, and data will soon be available from which national estimates may be derived. The second problem that we encountered had to do with the generally low base rates of heroin and methamphetamine use that resulted in relatively few NIISDA respondents indicating use for these drugs, thus making it difficult to generate reliable national estimates. Through meetings with SAMHSA staff, however, we were informed that recent significant increases in the number of households surveyed in the NHSDA will soon allow for a three-year panel of data that should overcome this problem. Thus, although were are not at this time able to implement our strategy of developing a national synthetic estimation model for illicit drug consumption, the data restrictions that currently hinder such an effort should be removed within the next 6 to 12 months. Once the requisite data are made available, we would strongly urge that work continue on the development of a national synthetic estimation model.

Summary

In our attempt to provide estimates of illicit drug availability in the U.S., we have exhaustively researched national and worldwide sources of information. The approaches taken and assumptions made in this research effort were guided by collaborative input from practitioners and policy makers from the intelligence, enforcement, research, treatment and laboratory communities. Although legitimate and significant concerns have been raised regarding the potential harm that can result from providing policy makers with estimates that may be in error given that they are based on imperfect data, we believe that greater harm is done by not attempting to develop such estimates. Guided by this philosophy, we present the following table, based upon a comprehensive review and analysis of available data pertaining to both supply and demand, as our best assessment to date of illicit drug availability and consumption in America.

Estimates for Availability and Consumption of Illicit Drugs in the U.S.

Source	Cocaine	Heroin	Meth	Marijuana
Supply side	419 mt	16 mt	66 mt	8,819 mt
Demand side	373 mt	11 mt	14 mt	4,270 mt

There are two key points to be made in regards to the estimates provided in the table above. The first is that our supply side estimates are consistently higher than the corresponding demand side estimates. This is not unexpected, given that the demand side estimates rely heavily on persons providing self-reports of illegal behavior and are therefore likely to be somewhat low. The second point is that for both supply and demand, the quality of available data are arguably best for cocaine and heroin, and it is for these drugs that our two estimates come closest to convergence. By contrast, the relatively larger gaps between the supply and demand estimates for methamphetamine and marijuana are likely explained by

the severe lack of data relating to the amount of each of these drugs that originates within the U.S. Given these issues, it is recommended that the most prudent way to apply the results provided above is to consider a range of illicit drug availability, bounded on the lower side by our demand estimate and on the higher end by our supply estimate (e.g., for cocaine, the availability estimate would be 373 to 419 metric tons). Finally, please note that we consider this to be an ongoing work in progress, and will continue our efforts to research data sources and refine our estimates accordingly.

Figure 5-1 - Full Market Model for Cocaine

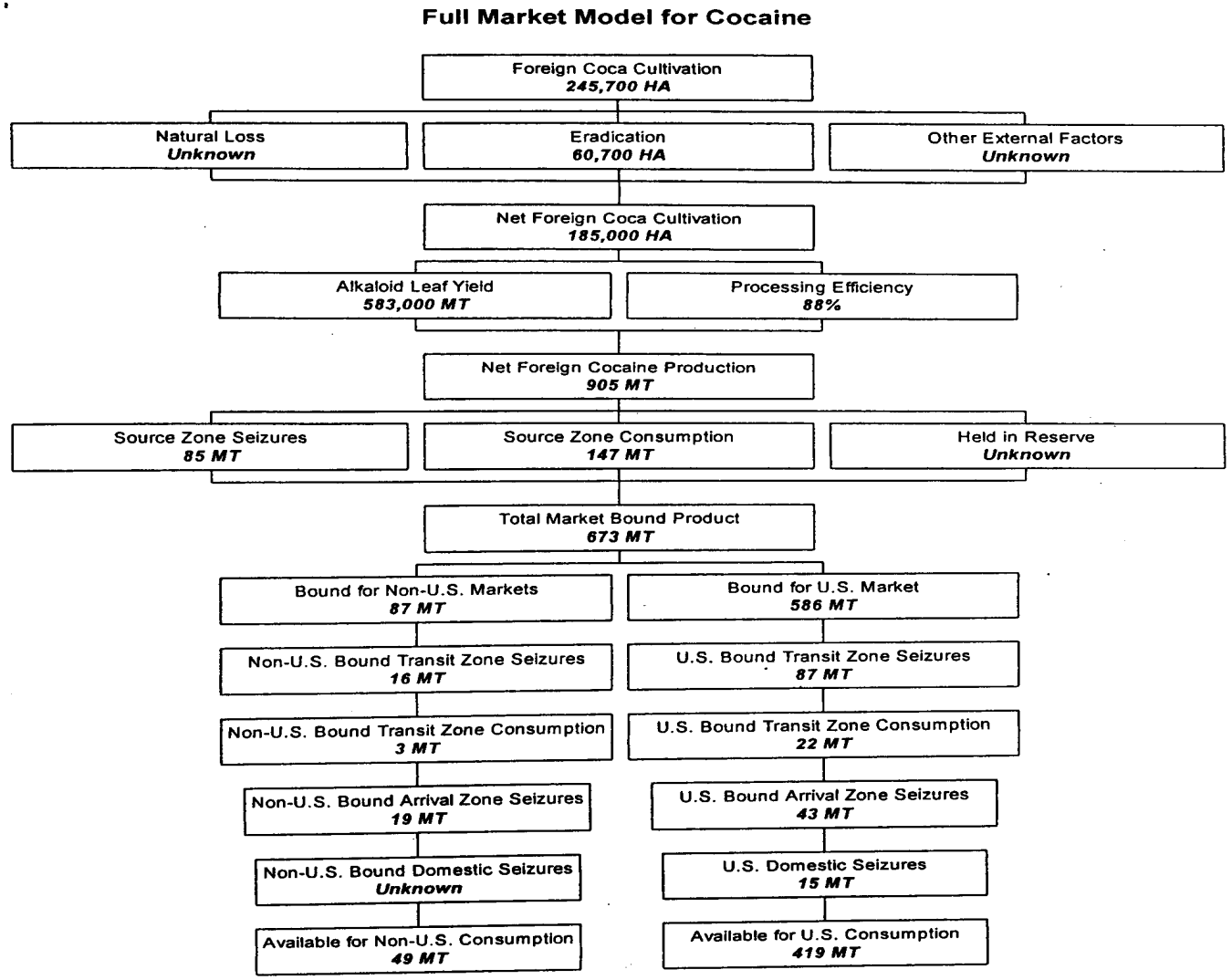


Figure 5-2 - Full Market Model for Heroin

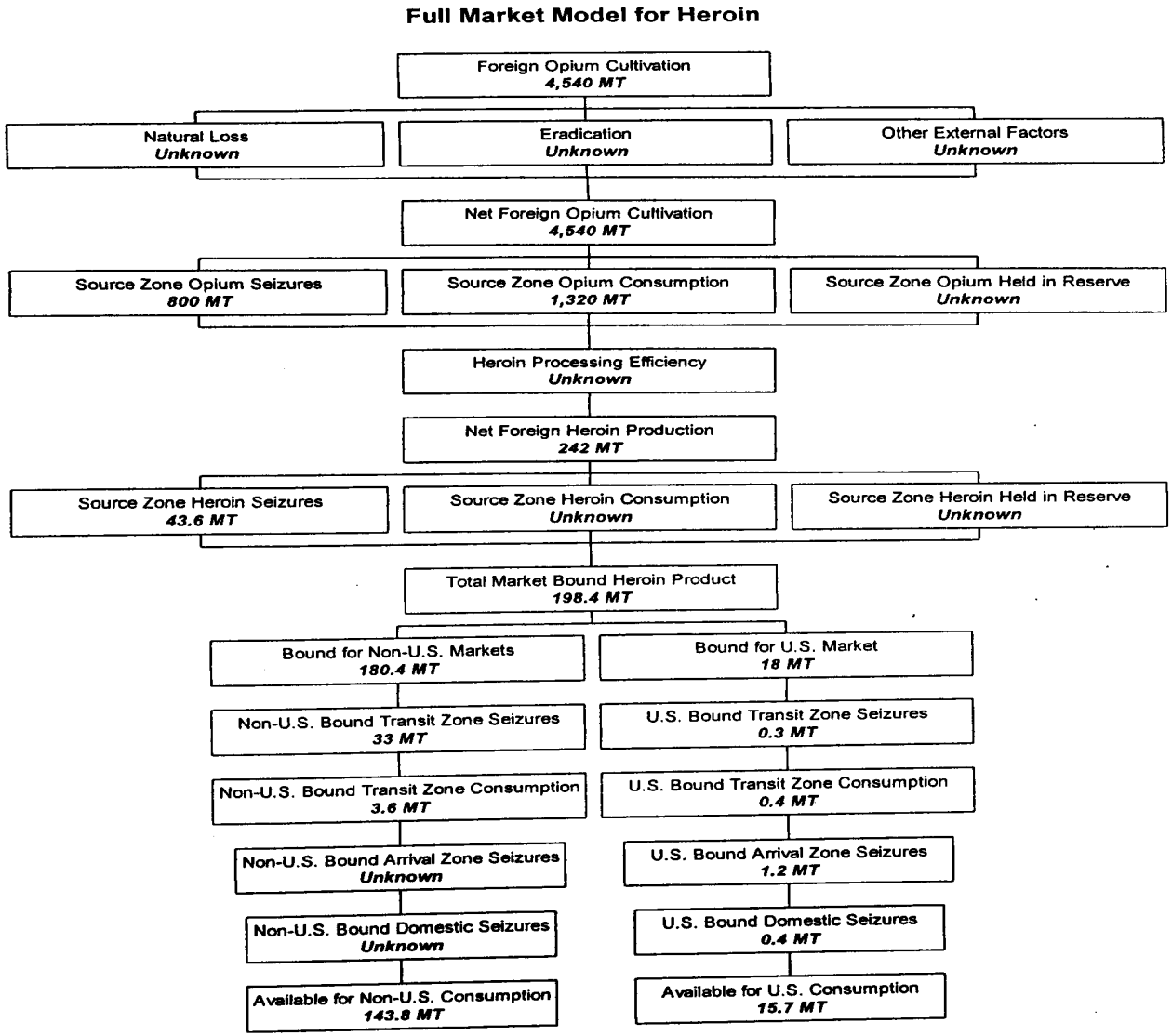


Figure 5-3 - Full Market Model for Methamphetamine

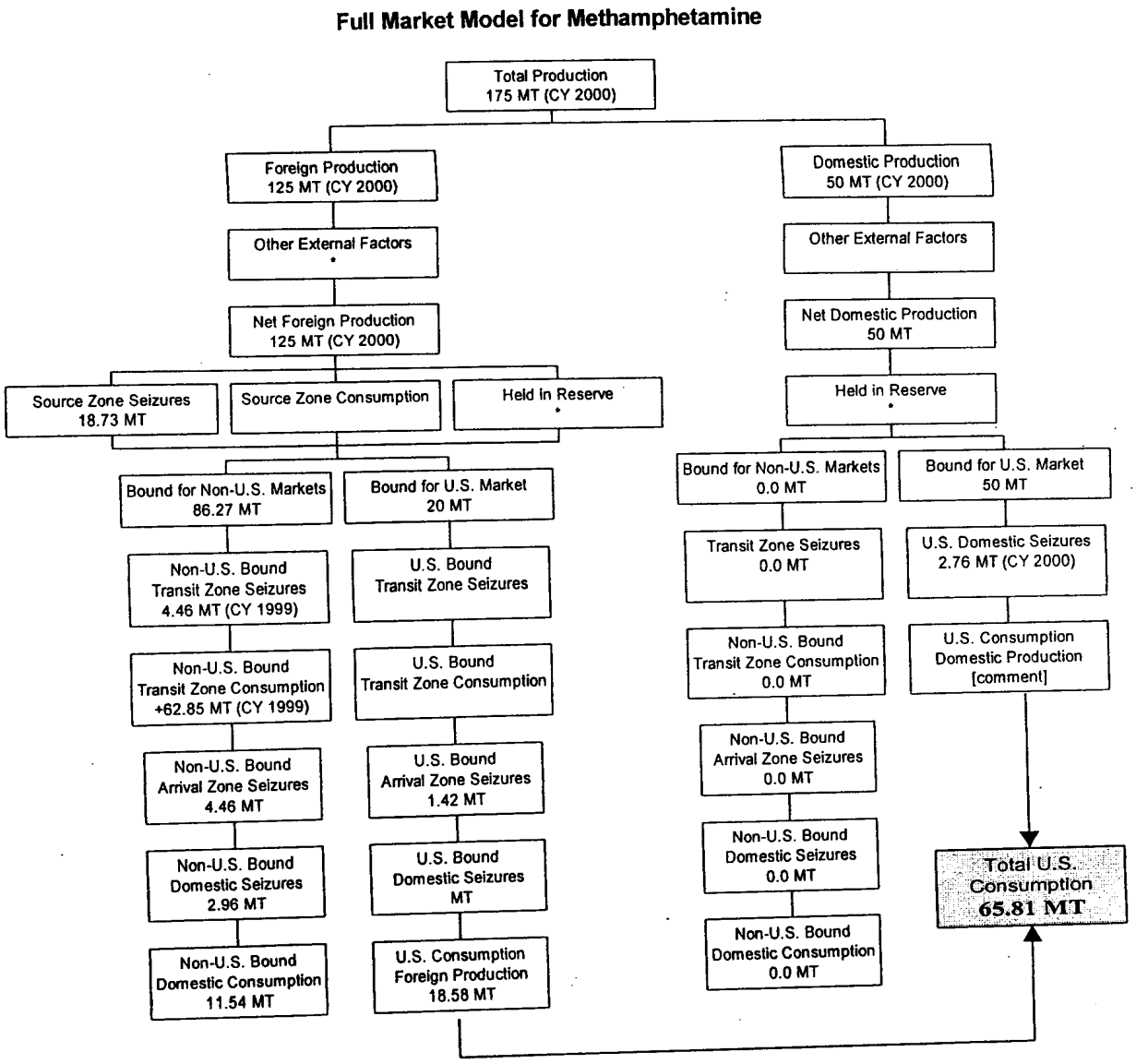


Figure 5-4 - Full Market Model for Marijuana

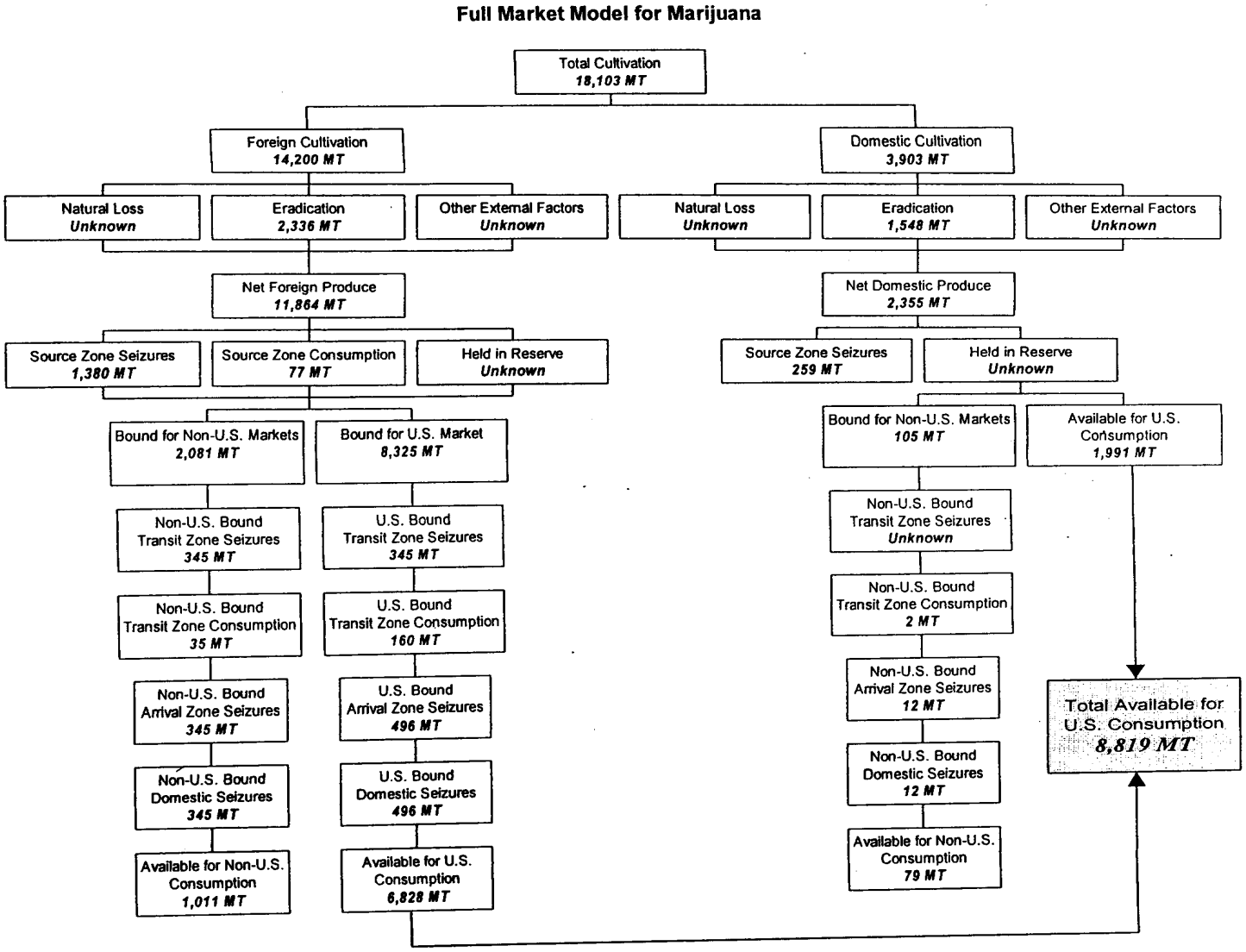


Table 5 - 8 What Americas Users Spend on Illegal Drugs – 2000

	Monthly Purchases	Users Per Day	Seizures(%)	User Estimate	Dosage	ONDCP Consumption Estimate	Estimation Formula	Modified Consumption Estimate
COCAINE	13-17	1.7-2.4	13% (56 MT)	5,460,000	100-200 mgs	269 MT		373 MT
Hardcore	51% of cocaine bought by 22% of sample	CRACK CASH 1.83-2.08 NONCASH 1.34-2.05		3,325,000			3,325,000 x 150 mgs x 52x2 ./. 1000 ./. 1000 ./.1000 = 363 MT	
Occasional				2,155,000			2,155,000 x 150 mgs x 4 x 12 ./. 1000 ./. 1000 ./. 1000 = 10.3 MT	
HEROIN	44-52	1.5-1.6	16% (1.6 MT)	1,491,000	10-20 mgs	12.9 MT		11.6 MT
Hardcore				977,000			977,000 x 20 mgs x 1.5 x 7 x 52 ./. 1000 ./. 1000 ./. 1000 = 10.66 MT	
Occasional				514,000			514,000 x 15 mgs x 4 x 12 ./. 1000 ./. 1000 ./. 1000 = .37 MT	
METHAM-PHETAMINE	CASH 3.17-13.25 NONCASH 1.5-9.9	CASH 1.02-1.26 NONCASH 1.0 – 1.26	22% (3.7 MT)	644,000	50-100 MGS	15.4 MT		14 MT
Users				356,000			356,000 x 100 mgs x 365 ./. 1000 ./. 1000 ./. 1000 = 13 MT	
Occasional				288,000			288,000 x 50 mgs x 4 x 12 ./. 1000 ./. 1000 ./. 1000 = .69 MT	
MARIJUANA				11,700,000		1,009 MT		4,270 MT
Users	50% of marijuana purchased by 25% of people in New York 50% of marijuana purchased by 10% of people in New Orleans CASH 5.98-13.27 NONCASH 7.56-10.35	CASH 1.07-1.21 NONCASH 1.17-1.23	22% (1,198 MT)	11,700,000	.3885 MGS		11,700,000 x 1 gram x 365 ./. 1000 ./. 1000 ./. 1000 = 4,270 MT	

Table 5-9 - Drug-Use Related Data Sets and Corresponding Demand Indicators

Drug Use-Related Data Sets and Corresponding Demand Indicators

Title of Data Set	Sponsoring Agency	Information Available	Population	Estimates				
				All Drugs	Marijuana	Cocaine	Heroin	Meth..
National Household Survey on Drug Abuse	Substance Abuse and Mental Health Services Administration	Presents prevalence for drug and alcohol by age, sex, and region	Household population age 12 and older	Estimated 14.0 million illicit drug users in the US (2000)	Estimated 10.6 million users in the US (2000)	Estimated 1.2 million users (2000)	Estimated 130,000 users (2000)	***
Monitoring the Future	National Institute on Drug Abuse	Reports estimates of drug, alcohol, and tobacco use, and attitudes toward drugs of abuse among American youths	6th, 8th, 10th, and 12th graders and youth adults age 19	8th graders: 26.8% 10th graders: 45.6% 12th graders: 54.0% (2000)	20.3% 40.3% 48.8% (2000)	4.5% 6.9% 8.6% (2000)	1.9% 2.2% 2.4% (2000)	4.2% 8.9% 7.9% (2000)
Arrestee Drug Abuse Monitoring Program	National Institute of Justice	Monitors the extent of drug use among arrestees by demographic characteristics, charge at arrest, treatment history, and socioeconomic characteristics.	Adult arrestees and juvenile detainees	***	Males 39% Females 26%(1999)	Males 34% Females 38%(1999)	***	***
Drug Abuse Warning Network	Substance Abuse and Mental Health Services Administration	Monitors drug abuse patterns and trends and assesses the health hazards associated with drug abuse by involvement of drugs in deaths and emergency department episodes.	Drug related deaths and emergency department episodes	243 ED visits per 100,000 population (2000)	39 ED visits per 100,000 population (2000)	71 ED visits per 100,000 population (2000)	39 ED visits per 100,000 population ^(2000)	6 ED visits per 100,000 population ^^(2000)
Treatment Episode Data Set	Substance Abuse and Mental Health Services Administration	A minimum data set, reported by States, of demographic and drug histsory variables on clients admitted to substance abuse treatment. Some States also submit a discharge data set.	Admissions to substance abuse treatment, primarily at facilities receiving public funds. Excludes Federally-owned facilities.	1.5 million annual admissions to treatment for abuse of alcohol and drugs (1998)	13% or about 195,000 admissions (1998)	15% or about 225,000 admissions (1998)	15% or about 225,000 admissions (1998)	5% or about 75,000 admissions (1998)

*** Figures not reported.
^ Includes heroin and morphine
^^ Includes methamphetamine and speed
Note: Note: Data set file, sponsoring agency, information available, and population information obtained through ONDCP at http://www.whitehousedrugpolicy.gov/drugfact/source.html

Appendix 5C- Heroin in the United States

The amount of heroin consumed in the United States is relatively unknown. Irregular consumption patterns and the unpredictability of addict populations preclude a precise calculation of consumption levels. However, data derived from drug treatment and law enforcement sources can be formulated into a consumption-based equation that yields a realistic estimate of domestic heroin consumption. This data includes the following information concerning the number of hardcore heroin addicts, dosage, and frequency of use.

- The current hardcore addict population in the United States is estimated to range between 750,000 and 1,000,000.[1] This estimate is based on an extrapolation from overdose deaths, number of applicants for treatment, and number of heroin addicts arrested. The most recent estimate of the domestic hardcore addict population is 980,000. This figure was derived from a 1999 study sponsored by the Office of National Drug Control Policy (ONDCP) designed to determine the expenditure habits of hardcore drug users in the United States. This study adopted the National Household Survey on Drug Abuse (NHSDA) and the Arrestee Drug Abuse Monitoring (ADAM) program definition of a hardcore addict as one who uses heroin more than 10 days in a month.

- An addict's use of heroin will fluctuate because of variations in personal and market conditions. The Treatment Episode Data Set (TEDS), which provides information on the demographic and substance abuse characteristics of individuals admitted to drug treatment programs, indicates that of the individuals in treatment for heroin abuse in 1996, 83.0 percent used daily, 4.0 percent used between three and six times a week, 1.8 percent used between one and two times a week, 2.2 percent used between one and three times a month, and 9.0 percent did not use during the month prior to their admission.

- Once addicted, each addict needs his or her own characteristic dose to keep from going into withdrawal. Withdrawal symptoms generally occur from 3 to 5 hours after an addict's last dose. Consequently, addicts must use heroin several times a day to avoid withdrawal.

- Addicts vary their heroin use depending on the time of day, the day of the week, and the other substances taken with the heroin. [121] Heroin addicts generally use the drug two to four times a day; however, more experienced users use more frequently, particularly at lower purity levels. As heroin use progresses, addicts develop a tolerance for the drug and must take higher doses more frequently to avoid withdrawal.

- An estimate of 50 mg of pure heroin a day was used as a realistic national average. This average daily amount is in all probability less than the requirements of many long-time addicts and considerably more than those of the increased number of younger, new users whose tolerance levels may still be relatively low. Many analysts and treatment professionals believe that the 50-mg daily heroin dose underestimates overall U.S market demand.

- Hardcore heroin addicts do not account for all heroin consumption in the United States. Hardcore addicts consume approximately 75 percent of the heroin used in the United States, while

[1] Joel G. Hardman, Alfred Goodman Gilman, Lee T. Limbird, eds., *Goodman & Gilman's The Pharmacological Basis of Therapeutics,* 9th ed., (New York: McGraw Hill, 1996), 567

[121] Michael Agar, Phillippe Bourgois, John French, and Owen Murduch, "Heroin Addict Size in Three Cities: Context and Variation." *Journal of Drug Issues* 28, no. 4. 1998:921-940.

occasional users—those who use less frequently than hardcore addicts—consume the remainder.[122]

- Other approaches using expenditure and supply data to estimate domestic heroin consumption have been developed. The expenditure approach estimates heroin consumption by multiplying the number of hardcore addicts by their admitted expenditures and then converting the result into kilograms of heroin, based on DMP price information. The supply approach estimates heroin consumption by valuing shipments of heroin to U.S. markets. Each approach estimates domestic heroin consumption using different variables, making comparison unreliable.

[122] Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs*, 1988-1995, 1997.

November 2001

MEMORANDUM FOR: Patrick R. Gartin, Chief, Statistical Section,
Drug Enforcement Administration

SUBJECT: Estimating the Heroin & Cocaine Threat to the United States

1. Because the distribution and sale of heroin (and other narcotic drugs) are illicit activities, the details of which the perpetrators wish to conceal, we believe the most realistic approach to estimating the heroin threat to the United States is to combine the fewest number of estimated variables that will capture the threat with sufficient accuracy to aid in formulating appropriate counterdrug policies. In our opinion, such an estimate would consist of the sum of consumption and seizures.

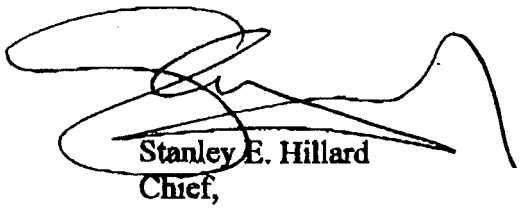
   - Since there is no rigorous estimate for heroin consumption in the United States, we suggest that the Counterdrug Community's agreed-upon consumption estimate of 18 metric tons (100 percent pure heroin) for the US be used as a starting point, to which would be added seizures at US borders and internal domestic seizures (both converted to 100 percent purity levels). In addition, any seizures in transit abroad that clearly can be identified as bound for the US should also be added, assuming we are trying to assess the threat specifically targeted toward the US market. If we are only trying to assess the threat within the United States, then only internal domestic seizures should be added to the consumption estimate

   - Given the level of resources available to the US Counterdrug Community, it is virtually impossible to estimate year-to-year changes in consumption. Thus, the 18 metric ton estimate reflects average annual consumption in recent years. Accordingly, the seizure data should also reflect average annual seizures over, say, a five-year period (e.g., 1996-2000). Based on seizure data available to this office, this average would approximate 2 metric tons annually.

2. Summing the consumption and seizure data yields an estimate of 20 metric tons annually as the heroin threat to the US. Although this is clearly an approximation of the threat, it probably makes little difference to policy formulation whether the true threat is within 2 or 3 metric tons on either side of 20 metric tons. Moreover, a rough check on this order of magnitude can be obtained from heroin consumption research conducted for other countries of similar size and socio-economic development levels (e.g., Europe). This research, detailed in the attachment to this memo, shows that heroin abusers consume an average of 60 to 120 milligrams of pure heroin per day, and that the bulk of abusers consume at the lower end of this range. Thus, if we assume that US heroin abusers consume at rates similar to their European counterparts and apply 60 milligrams to the current estimate of heroin abusers in the US (i.e., 980,000), the implication is that heroin consumption in the US would be 21.5 metric tons per year. Looked at another way, the 18

metric ton estimate of US heroin consumption implies a consumption rate of 50 milligrams of pure heroin per abuser per day. This is not unreasonable given the nature of these estimates.

3. The same approach can be taken to estimate the cocaine threat to the US. For example, based on ONDCP estimates of annual cocaine consumption in the US during 1996-1999, average annual consumption equals 292 metric tons of cocaine. To this figure should be added the same type of seizures described above for the heroin estimate (i.e., transit zone seizures, arrival zone border seizures, and domestic US seizures). This calculation yields a total average threat estimate for cocaine of 437 metric tons during 1996-99.



Stanley E. Hillard
Chief,

Attachment: A Direct Approach to Estimating Heroin Consumption

Attachment

A Direct Approach to Estimating Heroin Consumption

Our approach to estimating heroin consumption was based on detailed interviews with more than 250 officials and over 100 recovering addicts in 34 countries. The officials interviewed included law enforcement officers engaged in counterdrug activities at both the local and national levels, physicians and health officials engaged in treatment and rehabilitation of addicts, and some border patrol officers and ministerial level officials. Most of the interviewees had substantial experience in dealing with heroin addicts over periods of 5-10 years. Thus, in most cases the responses to our questions were based on substantial research and/or extensive experience with heroin abusers or abuse problems. In some cases, however, the answers to our questions were little more than educated guesses. During each interview, we posed the following set of questions:

- What is your estimate of the number of heroin abusers in your country? How many of these are hard-core addicts as opposed to recreational/casual users?

- What is the average quantity of heroin sold at retail on the street? How many individual doses does this quantity constitute?

- What is the average purity of these street sales?

- What is the frequency with which addicts consume a given dose (that is, how many times per day)?

We also asked a number of questions concerning the price of drugs, changes in use patterns over time, trafficking patterns and practices, arrests, rehabilitation programs, rates of relapse, etc. While responses to these latter questions added to our understanding of the overall nature and extent of drug abuse problems in the given country, it was the responses to the four key questions noted above that provided the basis for estimating the annual average consumption of a given drug.

Given the appropriate data, the calculation of annual average heroin consumption is shown in the following equations:

(I) (Average Street Buy) x (Average Purity) = Average Pure Street Buy

(2) (Avg. Pure St. Buy) / (Avg. No. of Doses/St. Buy) = Avg. Pure Dose

(3) (Avg. Pure Dose) x (No. of Doses/Day) = Avg. Daily Consumption/User

(4) (Avg. Daily Consumption/User) x (No. of Users) = Avg. Consumption/day

(5) (Avg. Consumption per day) x 365 = Average Consumption/year

The available data do not always fit neatly into these five equations. For example, whenever possible one must differentiate between abusers who are hard-core addicts and those who are merely recreational users, as both the dosage and frequency of use will be substantially different for each. While some countries can provide reasonable estimates of the number of addicts and the dosages they consume, none of the countries we visited could provide more than a tentative guess at the number of recreational users and the quantities and frequency of their consumption patterns.

Some international organizations—notably the United Nations Drug Control Program (UNDOP) and the European Monitoring Center for Drugs and Drug Addiction (EMCDDA)—have published data on various aspects of drug abuse in Europe and Asia. While we have considered these data in our research effort, neither organization, to our knowledge, publishes data on dosages or frequency of use, nor do they attempt to derive estimates of annual average consumption for individual countries. [1] Thus, we have relied primarily on data provided to us by the officials with whom we spoke in each of the individual countries. We believe that estimates of consumption based on basic information gathered at the local and national level provide the most realistic assessment of the consumption situation for that area or nation. However, due to the relatively short period of our research in each country and the resultant small sample of interviews obtained, we treat the data for each country as individual observations which we then average to arrive at an overall measure of average consumption per addict per day for each of three world regions, i.e., Europe, Southeast Asia, and Southwest Asia. The data on average daily consumption of pure heroin for each of the 34 countries visited are shown in figures 1-3 below.

Because the observations on frequency of administering the drug, as well as on the number of doses in the average street-buy, are based on the sample of users that were seen by either or both health and law enforcement officials, these observations likely reflect the high end of the heroin using population. For example, most of the users who either seek help from health facilities or cross the path of law enforcement officials are those who have been using the drug long enough to have built up substantial tolerance levels or developed serious health problems. Such abusers clearly would be using heroin at least once, if not multiple times, per day, Thus, the sample of users known to the officials we interviewed undoubtedly contains an upward bias when used to represent daily consumption rates for the entire population of abusers. In addition, the heroin using population in all countries is continually changing as hard-core addicts (who are more likely to come in contact with the officials we interviewed) enter treatment facilities, are arrested, or die, and new users (whose tolerance levels are low and who are less likely to have contact with health or law enforcement officials) begin the downhill slide toward addiction.[2] Since neither we, nor the officials we interviewed, have any idea how many causal users exist in the various countries (and may even underestimate the number of hard-core addicts), we can only hope that any upward bias in our observations is at least somewhat offset by our inability to account for casual users as well as unobserved addicts.[3]

[1] The UNDCP does publish an estimate of worldwide prevalence of drug use by drug type, but cautious that these figures must be interpreted with care.

[2] Varying definitions of the term "addict: pose substantial problems for estimating average consumption rates. Some countries consider an addict to be one who uses heroin at least once per week, while others use the term to describe users who take multiple doses per day. Since we cannot determine the distribution of users according to their rates of consumption, we have little choice but to accept the general consensus that the number of addicts cited for each country represent hard-core abusers who are using heroin at least once per day.

[3] According to the Dutch Office of Public Health, it generally takes from three to five years for an addict to become visible to a country's health official.

Chapter 6: Drug Seizures in the United States

Certainly, a desirable goal is to have a single database capable of providing a comprehensive picture of drugs seizures as the drugs approach, enter, and transit the United States. At this time, there is no single, unified, de-conflicted database for federal, state, and local drug seizures.

A variety of federal seizure databases exist, each tailored to meet specific needs. These databases overlap to a certain extent. Moreover, the federal databases contain information on an unknown portion of drug seizures made by state and local law enforcement authorities, such as seizures turned over to federal authorities or seizures reported to federal programs such as Operations PIPELINE, CONVOY, and JETWAY.

At this time, the only national data collection effort targeting state and local drug seizures is the National Forensic Laboratory Information System (NFLIS), which is managed by the DEA Office of Diversion Control. The NFLIS was designed to be a representative sample of state and local laboratories and recruitment efforts are ongoing. At this time, approximately 150 laboratories report to the NFLIS. The drug seizure information in the NFLIS, however, is limited to the drug evidence that the state and local authorities submit for forensic analysis. This represents an unknown portion of state and local drug seizure activity.

The Working Group recommends that development of a centralized database for all U.S. drug seizures be explored. At this time, we do not know how much of domestic drug seizure activity is missing from the federal databases. Is it a significant intelligence gap or is the missing amount relatively small? To that end, a survey of existing state and local law enforcement drug seizure databases should be conducted to determine the amount of drug seizures reported by those agencies and how the seizure data are stored. If a centralized database is to be created, it is necessary to have individual records for individual seizures so that duplicate reporting can be eliminated. If most states only collect summary seizure statistics, it would require a large investment of resources to develop incident-based databases for those states. The results from such a survey would enable drug policy makers to decide if it would be cost effective to develop a centralized drug seizure database.

Available Data Sources/Limitations

Federal Drug Seizures

- The most comprehensive federal database is the ***Federal-wide Drug Seizure System (FDSS),*** which was designed to provide one set of statistics that reflect the combined federal seizure effort. The FDSS contains information about drug seizures made within the jurisdiction of the United States by the Drug Enforcement Administration, Federal Bureau of Investigation, U.S. Customs Service, and U.S. Border Patrol, as well as maritime seizures made by the U.S. Coast Guard. Drug seizures made by other federal agencies are included in the FDSS database when custody of the drug evidence was transferred to one of the five agencies identified above. For the most part, drug seizures made by state and local law enforcement authorities are not included in the FDSS data.

- The ***EPIC Internal Database (EID)*** contains seizures, which meet Federal Drug Identification Number (FDIN) criteria, made in the United States by federal agencies and by state and local law enforcement personnel who seize the drug as part of DEA sponsored Operations PIPELINE, JETWAY, or CONVOY. Seizure events are <u>voluntarily</u> reported to EPIC by federal, state, and local law enforcement agencies. As a consequence, the seizure

statistics may not necessarily provide an accurate overview of drug trafficking or seizure trends.

- The ***Consolidated Cocaine database*** captures details surrounding each drug-related event submitted and approved by counter-drug agencies. It is used in the Interagency Assessment of Cocaine Movement.

- Drug found at clandestine laboratory seizures are reported to the ***Clandestine Laboratory Seizure System (CLSS),*** which is housed at EPIC, and was established in 1998 to capture data that pertains to clandestine laboratories that are seized in the United States by local, state, and federal law enforcement agencies. Once again, this database may not provide a comprehensive picture. Clandestine laboratory seizure events are voluntarily reported to EPIC by state and local law enforcement and most federal agencies. DEA is the only federal agency that is required to report clan lab seizures to EPIC.

State and Local Drug Seizures

- At this time, the only national data collection effort targeting state and local drug seizures is the ***NFLIS***, which is managed by the Office of Diversion Control of the DEA. The NFLIS was designed to be a representative sample of state and local laboratories and recruitment efforts are ongoing. At this time, approximately 150 laboratories report to the NFLIS. The drug seizure information in the NFLIS, however, is limited to the drug evidence that the state and local authorities submit for forensic analysis. This represents an unknown portion of the entire drug seizure activity.

- ***At the state level***, data are maintained on law enforcement activity , including drug seizures. However, incident-based reporting is needed in order to build a national database so that duplicate reporting could be eliminated. General information on state drug seizure systems, which was provided by the National Drug Intelligence Center (NDIC), is contained in the Appendix.

Drug Prices

- DEA's Quarterly Trends in the Traffic Reports: Intelligence reports submitted by DEA Intelligence Groups in DEA field offices. Generally, prices are reported for gram, ounce, and kilogram quantities.

  This price information is of limited value for trending since the prices are reported as ranges.

- DEA's System To Retrieve Information from Drug Evidence (STRIDE): STRIDE contains information on drug exhibits submitted to DEA laboratories for analysis, including price if the exhibit was a purchase.

  The purchases are made in the course of federal drug investigations. Consequently, the amount of price information varies. For example, there may be no information on cocaine kilogram prices for a given time period because no such purchases were made. Nonetheless, STRIDE can be used to track certain prices. ONDCP has used STRIDE data to develop price series for selected drugs.

Drug Purity

- STRIDE: With the exception of marijuana, DEA laboratories regularly quantify drug evidence. (DEA laboratories send samples from marijuana seizures to Marijuana Potency Monitoring Project at the University of Mississippi for THC content determination.) Contained in the STRIDE database are the analysis results for retail heroin purchases made for the Domestic Monitor Program.

  Once again, the purity information is limited to federal drug evidence, primarily DEA.

Appendix 6-A - Federal Data Set Specifications

Sources: ONDCP's Federal Data Set Inventory
NDIC

Data Set: National Forensic Laboratory Information System (NFLIS)

Frequency Of Data Collection: Ongoing data collection

Sponsoring Agency: The Drug Enforcement Administration (DEA)

Point(s) Of Contact:
Name: Frank Sapienza
Title: Chief, Drug & Chemical Evaluation Section
Address: Drug Enforcement Administration
Washington, DC 20537
Telephone No.: (202) 307-7183
Fax No.: (202) 353-1263

Purpose Of The Data Set: The NFLIS database is being developed to provide accurate, scientifically verified data to support DEA drug scheduling actions; to provide information on drug trafficking and abuse to other federal, state and local authorities; to identify changes in drug distribution geographically and over time; to provide information on diversion of legitimate pharmaceutical drugs; and to identify new and emerging drugs of abuse and follow their spread.

How And To Whom The Data Are Disseminated: NFLIS data are published in Quarterly Reports four times a year that are sent to participating laboratories and the DEA. The first Annual Report was published in December 2001. Participating laboratories can access all of their own data elements and can also access aggregate data from all other participating laboratories. Future DEA plans are to make the data also available to approved requestors via the Internet. Standard on-line queries have been developed by the contractor for this purpose.

Available Formats: The results of queries from the database can be printed or downloaded into various spreadsheet programs or file formats. Results can be downloaded directly into Excel or .htm, .html and, .txt formats. Numerous other file formats are available.

Sample Size Of Data Set: Each NFLIS record represents the results of a forensic laboratory scientific analysis of a drug sample submitted by U.S. law enforcement agencies. As of November 14, 2001, there were 1,496,454 records of analyzed drug samples in the NFLIS system.

Methodology (Sample Design, Time Frame, Criteria for Sample Selection, Sources of Data, Method of Data Collection, Validity and Reliability Checks, and Type of Data Collected):
The NFLIS database contains laboratory analysis results of illicit drug samples seized or purchased by U.S. law enforcement agencies. The results are submitted by state and local forensic laboratories in the United States. The database development started in September 1997. Records are from the time period September 1997 to December 2001 at this time. An initial sampling of laboratories was selected for recruitment that would represent approximately 70% of the drug samples analyzed by all forensic laboratories in the United States. That sample has not been completely recruited at this time. Coverage at this time is estimated to be about 65%. The data is electronically transmitted by the reporting laboratories to the contractor via encrypted format. The data is scientifically verified forensic laboratory data.

Drug-Related Variables: Variations in laboratory operating procedures determine depth of analysis of samples. All laboratories do not report secondary drugs in samples. All drug samples submitted to forensic laboratories are not analyzed. Reporting of non-controlled drugs varies from laboratory to laboratory.

Other Variables: There is variation between laboratories on the drug related data elements reported for drug samples.

Strengths And Limitations Of The Data Set: The strength of the data is that they are scientifically accurate and verified. Limitations arise from variations in laboratory operating procedures that determine depth of analysis of samples and manner of reporting of testing results. All laboratories do not report secondary drugs in samples. All drug samples submitted to forensic laboratories are not analyzed. Identification and/or reporting of non-controlled drugs varies from laboratory to laboratory. Data cannot be trended at this time because the number and type of laboratories that are reporting are not a representative samples at this time. The database does not contain information from Federal laboratories.

Implications For Drug Policy: The NFLIS system is the first attempt to gather analyzed state and local forensic laboratory drug data. The DEA anticipates that the data will be used by federal and state drug abuse control authorities to support drug scheduling and policy issues. The data can also be used by law enforcement personnel to identify specific geographic drug problems and follow the spread of new drugs of abuse.

Data Set: Federal-wide Drug Seizure System (FDSS)

Frequency Of Data Collection: Monthly

Sponsoring Agency: The Drug Enforcement Administration (DEA) manages the database.

Point(s) Of Contact:
Patrick Gartin
Drug Enforcement Administration
Washington, D.C 20537
Telephone No.: (202) 307-8276
Fax No.: (202) 307-7916

Purpose Of The Data Set: The FDSS was designed to meet a specific need defined by the National Drug Policy Board: to provide aggregate statistics on federal drug seizures made within U.S. jurisdiction. This need arose because of frequent instances when more than one federal agency is involved with or has custody of a single drug seizure. Each agency maintains its own records on such activities, which overlap the contents of other agencies' similar records; therefore, federal drug removal activity would be significantly overstated if statistics from individual agency databases were simply added together.

How And To Whom The Data Are Disseminated: Summary data are published semiannually and are distributed to Federal managers.

Available Formats: Printouts, as well as responses to standard queries that are returned to the monitor from which the query was made.

Sample Size Of Data Set: Each FDSS record tagged with a Federal Drug Identification Number (FDIN), as well as seizures under the required threshold amount which do not need FDINs.

Methodology (Sample Design, Time Frame, Criteria for Sample Selection, Sources of Data, Method of Data Collection, Validity and Reliability Checks, and Type of Data Collected): FDSS data are based upon extracts of drug removal information from databases maintained by the DEA, U.S. Customs, and the U.S. Coast Guard, as well as U.S. Border Patrol seizures reported in the FDIN log. In these databases, records of drug removals that exceed established threshold weights include a unique number, the FDIN, which is assigned to a drug removal by the first federal agency having custody of the drug. The FDIN is provided to any other federal agency that has involvement in or takes custody of the drug seizure for inclusion in its database. When data from agencies are entered into the FDSS, the presence of more than one record for the same seizure is determined by the FDIN. It should be noted that the extracts from those agency systems include all drug removals, both those with and without FDINs.

Drug-Related Variables: Each record in the FDSS has fields for the type of drug; quantity and unit of measure; how the drug was identified (i.e., laboratory analysis, field test, or visual examination); how the weight was determined (i.e., in a laboratory, via scale or balance, or estimated); data collected; place collected (State only); and FDIN.

Other Variables: None available.

Strengths And Limitations Of The Data Set: The FDSS provides information of Federal drug seizure activity.

Because the system was designed to provide summary information, there is limited information on each individual seizure. Furthermore, because the FDSS is a combination of data from several databases, with drug identity and weight sometimes based on visual examination and estimation, the statistics are not as precise as those based solely on laboratory analysis.

Implications For Drug Policy: The FDSS helps to inform national drug policy by providing long-range trends on the nature and extent of Federal drug seizures.

Data Set: System To Retrieve Information Drug Evidence (STRIDE)

Frequency Of Data Collection: Ongoing data collection

Sponsoring Agency: The Drug Enforcement Administration (DEA)

Point(s) Of Contact:
Rhesa G. Gilliland
Laboratory Support Section
Drug Enforcement Administration
Washington, DC 20537
Telephone No.: (202) 307-8785
Fax No.: (202) 307-8851

Purpose Of The Data Set: To maintain an inventory of drug exhibits submitted to DEA laboratories.

How And To Whom The Data Are Disseminated: Summary data are published semiannually and distributed to DEA managers in its Headquarters and field offices. All DEA field offices have access to and may query STRIDE via a generalized query capability for generalized reports. DEA Headquarters also uses a separate, more powerful query capability to generate a wide variety of statistical reports.

Available Formats: Data are available in printouts, including responses to standard queries that are returned to the monitor from which the query was made.

Sample Size Of Data Set: Information is input at each of the eight DEA laboratories using source documents from special agents and forensic chemists for over 40,000 exhibits of drug evidence per year. The system has been operational since 1971.

Methodology (Sample Design, Time Frame, Criteria for Sample Selection, Sources of Data, Method of Data Collection, Validity and Reliability Checks, and Type Of Data Collected):
See response to item above.

Drug-Related variables: STRIDE contains all the information from the laboratory analysis of each exhibit. There are approximately 60 data elements of information concerning each exhibit, such as data collected, place collected, how acquired (e.g., purchased, seized), price if purchased, name of the drug, potency of the drug, adulterants and diluents found, and how the exhibit was packaged.

Other Variables: One variable is the DEA case from which the drug exhibit was acquired.

Strengths And Limitations Of The Data Set: STRIDE can provide detailed information on a large volume of federal drug removals over a relatively long period of time. However, its data are limited because (1) the system includes little information about state and local activities that comprise an important element of the Nation's drug control efforts and (2) DEA's formal mandate is to focus enforcement activities on distinct geographical areas (such as trafficking areas with numerous high-volume heroin and cocaine dealers).

Implications For Drug Policy: STRIDE information is used as an investigative tool by agents in the field and provides a database which is used to analyze both strategic and tactical intelligence, establishing drug-trafficking patterns as well as detecting the appearance of new drugs.

STRIDE helps inform national drug policy by providing indicators of drug availability in the form of long-term trends in the price and purity of drug exhibits.

Statewide Drug Seizure Systems

State	Statewide Seizure System	
Alabama	No.	
Alaska	Yes.	The Statewide Drug Enforcement Unit, comprised of five teams: Anchorage Airport Interdiction Team; Fairbanks Areawide Narcotics Team; Mat-Su Drug Enforcement Team; Southeast Alaska Narcotics Team; and Western Alaska Alcohol and Narcotics Team, report drug seizures on a monthly basis to the Statewide Drug Enforcement Unit.
Arizona	Yes.	Unclear as to the comprehensiveness of the system.
Arkansas	No.	There is no central system for state seizures however, the Arkansas State Police compile some state seizure statistics such as methamphetamine laboratory seizures, while other statewide seizure statistics are available from the State of Arkansas, Annual Report for its Byrne Grant drug task forces.
California	No.	
Colorado	No.	
Connecticut	Yes.	
Delaware	No.	
Florida	Yes.	Florida Department of Law Enforcement's DrugNet program tracks statewide drug seizures. It is incident based.
Georgia	No.	
Hawaii	No.	
Idaho	Yes.	It is an incident based system
Illinois	Yes.	Although not compiled in one collective report, Illinois captures quantities of drugs and type seized through two separate enforcement programs. Operation Valkyrie is the Illinois State Police interdiction program on Illinois' highways and the Metropolitan Enforcement Group (MEG) units are the multi-jurisdictional drug task forces located throughout the state (9 total).
Indiana	No.	
Iowa	Yes.	Fairly comprehensive system administered by the Iowa Division of Narcotics Enforcement (under the Department of Public Safety.) Statistics only include Iowa State Patrol seizures as well as seizures from cases with Iowa DNE participation.
Kansas	Yes.	Kansas Bureau of Investigation maintains drug seizure statistics for drugs interdicted by the KBI. Additionally, Kansas Highway Patrol maintains separate statistics for drug seizures that occur along Kansas highways.
Kentucky	No.	
Louisiana	Yes.	Limited to Louisiana State Police seizures.
Maine	Yes.	
Maryland	Yes.	
Massachusetts	Yes.	
Michigan	No.	Michigan is developing a statewide drug seizures tracking system that they believe will be operational by November 2002.
Minnesota	No.	Only Byrne Grant task force drug seizures are recorded to the Byrne Grant Coordinator.
Mississippi	Yes.	Limited to Mississippi Bureau of Narcotics seizures and does not include all drugs.
Missouri	Yes.	Missouri State Highway Patrol maintains the ECCO (Eliminate

		Contraband Courier Operations seizures) database to track drug seizures made by Missouri Highway Patrol. This would only be a portion of total drugs seized in the state.
Montana	Yes.	The Montana Department of Justice, Board of Crime Control compiles state statistics from the six Byrne Grant drug task forces, the Department of Criminal Investigation, and some local seizure information.
Nebraska	Yes.	Nebraska State Patrol maintains a drug seizure system but it only includes seizures by the State Patrol – very limited.
Nevada	Yes.	Seizures are tracked by drug type.
New Hampshire	No.	
New Jersey	No.	
New Mexico	Yes.	The New Mexico HIDTA coordinates the compilation of New Mexico state drug seizures and reports the figures quarterly.
New York	No.	
N. Carolina	Yes.	Limited to North Carolina Bureau of Investigation seizures.
North Dakota	No.	
Ohio	No.	
Oklahoma	No.	
Oregon	No.	
Pennsylvania	No.	
Puerto Rico	Yes.	Limited to Puerto Rico Police and reporting appears sporadic.
Rhode Island	No.	
S. Carolina	No.	
South Dakota	Yes.	South Dakota Division of Criminal Investigation maintains a statewide database of task force seizures.
Tennessee	Yes.	Limited to Tennessee Bureau of Investigation seizures. It is case/incident based.
Texas	Yes.	Texas Department of Public Health tracks statewide drug seizures. It is incident based.
Utah	Yes.	The Utah Department of Public Safety, Bureau of Criminal Identification compiles state seizure statistics for most drugs but the comprehensiveness of the system is unclear.
Vermont	No.	
Virginia	No.	
West Virginia	Yes.	
Wisconsin	No.	Only Byrne Grant task force drug seizures are recorded to the Byrne Grant Coordinator.
Wyoming	Yes.	Fairly comprehensive system administered by the Wyoming Department of Criminal Investigation. Includes all highway patrol and task force seizures but may miss some local police seizures.

Glossary - List of Acronyms

ADAM	Arrestee Drug Abuse Monitoring program (formerly the DUF program)
CCDB	Counterdrug Consolidated Database
CDSM	Combined Dominant Source Methodology
CEWG	Community Epidemiology Working Group
CIA	Central Intelligence Agency
CLSS	Clandestine Laboratory Seizure System
CNC	Crime and Narcotics Center
CONACE	National Council for Drug Control
CSP	Cocaine Signature Program
DASC	Drug Availability Steering Committee
DAWN	Drug Abuse Warning Network
DCE/SP	Domestic Cannabis Eradiction/Suppression Program
DEA	Drug Enforcement Administration
DMP	Domestic Monitor Program
DUF	Drug Use Forecasting program (now the ADAM program)
EID	EPIC Internal Database
EMCDDA	European Monitoring Centre for Drugs and Addiction
EPIC	El Paso Intelligence Center
ER	Emergency Room
FARC	Revoluntionar Armed Forces of Columbia
FBI	Federal Bureau of Investigation
FDIN	Federal Drug Identification Number
FDSS	Federal Drug Seizure System
HCL	hydrocloride
HSP	Heroin Signature Program
IACM	Interagency Assessment on Cocaine Movement
MAWG	Marijuana Availability Working Group
MCEDSS	Mississippi Counterdrug Enforcement Decision Support System
ME	Medical Examiner
MSA	metropolitan statistical area
MT	metric tons
MTF	Monitoring the Future
NDIC	National Drug Intelligence Center
NDIN	National Drug Identification Number
NFLIS	National Forensic Laboratory Information System
NGO	NonGovernmental Organization
NHSDA	National Household Survey on Drug Abuse
NIDA	National Institute on Drug Abuse
NIJ	National Institute of Justice
ONDCP	Office of National Drug Control Policy
POE	Ports of Entry
PRIDE	Parents Resourse Institute for Drug Education
SA	South America
SAMHSA	Substance Abuse and Mental Health Services Administration
SEA	South East Asia
STL	Small Toxic Laboratories
STRIDE	System To Retrieve Information from Drug Evidence
STRL	Special Testing Research Laboratory

SWA	South West Asia
SWB	Southwest Border
TEDS	Treatment Episode Data Set
THC	*delta-9 tetrahydrocannabinol* (the active ingredient of marijuana)
UCR	Uniform Crime Reports (compiled by the FBI)
UNDCP	United Nations Drug Control Policy
USCS	U.S. Customs Service
USIC	U.S. Interdiction Command
WG	Working Group

REFERENCES

Agar, M., Bourgois, P., French, J, and Murduch, O. 1998. "Heroin Addict Size in Three Cities: Context and Variation," *Journal of Drug Issues* 28(4):921-940.

Everingham, S.; Rydell, C.; and Caulkins, J. 1995. Cocaine consumption int the United States: Estimating past trends and future scenarios, *Socio-Economic Planning Sciences* 29(4):305-314.

National Drug Intelligence Center. 2000. *Interagency Domestic Heroin Threat Assessment*, Appendix B: Heroin Consumption in the United States. February.

National Drug Intelligence Center. 200_. *National Drug Threat Assessment 2002*.

National Research Council. 2001. *Informing America's Policy on Illegal Drugs: What We Don't Know Keeps Hurting Us.* Washington, DC: National Academy Press.

Office of National Drug Control Policy. 2001a. *The Price of Illicit Drugs: 1981 through the Second Quarter of 2000.* Report prepared by Abt Associates, Inc. submitted to the Office of National Drug Control Policy under DHHS Contract Number 282-98-0006, October.

Office of National Drug Control Policy. 2001b. *What America's Users Spend on Illegal Drugs, 1988-2000.* Report prepared by Abt Associates, Inc. submitted to the Office of National Drug Control Policy under DHHS Contract Number 282-98-0006, December.

Office of National Drug Control Policy. 1999. *Report of the Drug Control Research, Data, and Evaluation Committee.* January.

Office of National Drug Control Policy. 1994. *Heroin Users in New York, Chicago, and San Diego*, November.

Simeone, R.; Rhodes, W.; Hunt, D.; and Truitt, L. 1997. *Methodology for Estimating the Number of Hardcore Drug Users*. Report submitted to the Office of National Drug Control Policy. March.

U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Office of Applied Studies. 2001. *Summary of Findings from the 2000 National Household Survey on Drug Abuse*. Rockville, MD. September.

U.S. Department of Justice, National Drug Intelligence Center. 2001. *National Drug Threat Assessment 2002.* December.

White House, The. 2002. *National Drug Control Strategy, FY2003 Budget Summary*. Washington, DC. February.

UNPUBLISHED MATERIALS:

U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Office of Applied Studies. n.d. *2001 HSDA Computerized Questionnaire and Specifications (CAPI and ACASI)*. Rockville, MD.

Drug Enforcement Administration. 2001. Memorandum to Martin W. Pracht, Chief, Executive Policy and Strategic Planning Staff, from Patrick R. Gartin, Chief, Statistical Services Section. Status

Report on Efforts to Develop Estimates of the Availability of Illicit Drugs for U.S. Consumption. 19 December. Attachments*: Full Market Models*.

Crime and Narcotics Center. 2001. Memorandum for Patrick R. Gartin, Chief, Statistical Section, from Stanley E. Hillard, Chief, Narcotics Production & Flows Group. Estimating the Heroin & Cocaine Threat to the United States. November 7. Attachment: *A Direct Approach to Estimating Heroin Consumption*.


NCJ 197107