A reduction in the availability of heroin in Australia

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ABSTRACT

After December 2000, Australia's illicit drug markets experienced an unexpected, dramatic reduction in the supply of heroin. The reduction in supply was sustained throughout 2001 in jurisdictions in which heroin had been easily available, decreasing in price and relatively pure. The heroin shortage provided an unprecedented opportunity to examine the impact of a marked reduction in the availability of the preferred drug of the majority of participants in a contemporary injecting drug market. In the present article, the authors examine the existing knowledge regarding the heroin shortage. A historical overview of Australia's heroin markets is provided, and the heroin shortage is characterized in terms of changes in the price, purity and availability of the drug. The short-term changes associated with the heroin shortage are examined, and data are presented relating to: (a) self-reported patterns of heroin use among injecting drug users; (b) health outcomes, including treatment episodes and ambulance attendances at suspected opioid overdoses; and (c) drug-related criminal activity recorded by the Attorney-General's Department of New South Wales. The hypotheses regarding the causes of the heroin shortage are presented, and an ongoing in-depth study, funded by the Australian law enforcement sector and designed to examine the causes, effects and implications of the shortage, is described. Subsequently, the global implications of a localized and potentially short-term change in heroin availability are considered, particularly in the light of indications of a shift to other drug use among some primary heroin users. Technical challenges to understanding the causes of the heroin shortage are identified.

Keywords: heroin, Australia, supply reduction, heroin shortage.

Introduction

Starting in late December 2000, the illicit drug markets in Australia experienced an unexpected and dramatic reduction in the supply of heroin. The reduction in supply was sustained throughout 2001 in all jurisdictions in which heroin had, for some years previously, been freely available, decreasing in price and relatively pure [1]. The reduced availability of heroin was remarkable in terms of its magnitude and prolonged nature; it provided an opportunity to examine the impact of a marked reduction in the availability of the preferred drug of the majority of participants in a contemporary illicit drug market.

The present article provides an overview of the existing knowledge regarding the heroin shortage. A brief historical background of heroin use in Australia is presented, and the heroin shortage is characterized in terms of its effects on the price, purity and availability of the drug. The short-term effects of the shortage are examined using data relating to: *(a)* changes in self-reported patterns of heroin use among injecting drug users (IDU); *(b)* health outcomes, including treatment episodes and ambulance attendances at suspected opioid overdoses; and *(c)* changes in criminal incidents for drug possession or use, as well as drug dealing or trafficking, recorded by the Bureau of Crime Statistics and Research of the Attorney-General's Department of New South Wales. The hypotheses advanced thus far regarding the causes of the heroin shortage are critically examined; they involve: *(a)* conditions in source countries; *(b)* strategic changes among heroin traffickers; and *(c)* increased success of interdiction efforts. An ongoing study designed to investigate fully the causes, effects and implications of the reduced availability is described. The global implications of a localized and potentially short-term change in heroin availability are then considered, particularly in the light of indications of a shift to other drug use among some primary heroin users. Technical challenges to understanding the causes of the heroin shortage are identified.

Monitoring trends in illicit drug markets

In recent years, there has been increased recognition of the importance of drug information systems. Both the United Nations (see the Declaration on the Guiding Principles of Drug Demand Reduction (General Assembly resolution S-20/3, annex)) and the European Monitoring Centre for Drugs and Drug Addiction [2] have highlighted the importance of making regular assessments of areas such as drug use among the general population, problematic drug use, treatment-seeking behaviour and drug-related morbidity and mortality. A number of drug information systems cover these and other areas in Australia, including national prevalence surveys, drug treatment surveys and statistics, illicit drug user surveys (including surveys of more specific population subgroups, such as youth, injecting drug users or incarcerated drug users), statistics on drug-related harm (for example, morbidity and mortality, law enforcement data on criminal activity), key informant interviews and police detainee surveys and urinalyses.

Together, the above-mentioned indicators contribute to the development of a more complete picture of illicit drug markets [3, 4]; however, because none of the indicators were established prior to the 1990s, this depth of knowledge extends back less than a decade. Thus, of the three periods in which heroin markets have undergone rapid expansion, the parameters of only the most recent have been systematically documented. The regular collection during this time of comparable assessments of key market indicators has provided a framework within which to detect trends over time in market conditions [5-8].

Australia's heroin markets in the late 1990s

The National Drug Strategy of Australia was established in 1985; governments at all levels—federal, state and territory—committed themselves to three years of supporting the Strategy [9]. From the inception of the Strategy, the importance of adopting a comprehensive, integrated approach to dealing with the harmful use of licit and illicit drugs was recognized [10]. The overall objective of the Strategy was, and remains, to minimize the harmful effects of drugs in Australian society [11, 12].

Under the current National Drug Strategic Framework 1998/99-2002/03 (which has since been extended to 2003/04) [13], the objective of the Strategy is to be realized through the implementation of programmes and policies directed at three broad areas: supply reduction; demand reduction, including abstinence-oriented interventions; and reduction of the adverse health and social consequences of drug use. The Strategy was designed not only to strengthen partnerships between the federal and state governments, but also to forge links between the health and law enforcement sectors by achieving an appropriate balance between supply reduction and demand reduction activities [14].

The increase in the number of opioid overdose deaths during the middle and late 1990s [15, 16] (see figure I) sparked concerns that illicit heroin markets were undergoing a third period of rapid growth. An important difference between the latest growth period and the earlier ones, however, is that the most recent expansion occurred within the context of vastly improved drug monitoring and information systems [3, 4]. Those drug monitoring and information systems provided a solid empirical basis from which to begin to derive an understanding of the changes that occurred.

During the period 1996-2000, the annual collection of comparable data from each of the eight jurisdictions of Australia made possible the first detailed description of illicit drug markets throughout the country. Those data indicated that, throughout the late 1990s, heroin was the drug injected most often in Australia [17]. Six jurisdictions contained viable heroin markets,* as defined by the consistent availability of the drug to regular market participants and its

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*In two smaller, satellite markets in which heroin has not been readily available, the illicit use of other opioid preparations has dominated, namely methadone in Tasmania [18] and morphine in the Northern Territory [19].

**Figure I.   Opioid overdose deaths among persons aged 15-44 years
in Australia, by jurisdiction, 1988-2001**
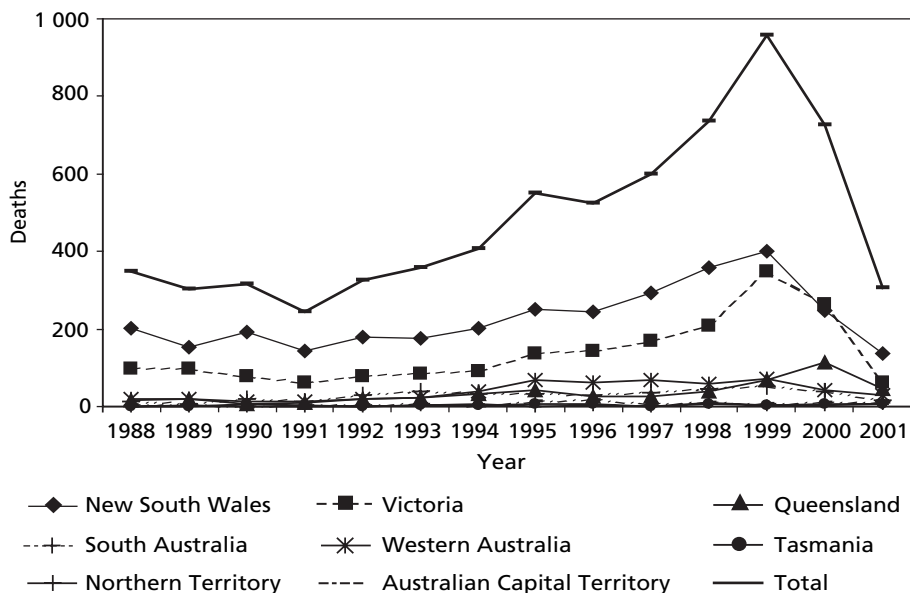
Source: Australian Bureau of Statistics.

widespread use among them [20]. Reports regarding the preferred drugs and
patterns of use of IDU suggested that, in particular, heroin dominated illicit drug
markets in the south-east part of mainland Australia. That area included the
two most populous states, New South Wales and Victoria. On the basis of the
proportion of total opioid overdose deaths that occur within each jurisdiction
(see figure I), it has been estimated that New South Wales and Victoria account
for one half and one quarter, respectively, of the heroin markets in Australia
[21]. Although hidden populations cannot be precisely defined, the capital cities
of New South Wales (Sydney) and Victoria (Melbourne) are assumed to contain
the majority of illicit drug market participants in those states. Law enforcement
intelligence indicated that Sydney remained the centre of heroin importation
and trafficking in Australia during the period 2000-2001 [23].

The data collected also suggested that heroin markets underwent rapid
expansion during the late 1990s. In the six jurisdictions containing viable heroin
markets, annual surveys of sentinel populations of IDU and key informants who
worked in the field repeatedly found that the availability of heroin had remained
consistently high [20]. Furthermore, the price of heroin either remained stable
or decreased every year: in Sydney, it decreased by almost one half, from a
median of 400 Australian dollars* per gram in 1996 to A$ 220 in 2000 [6]. The

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*All prices cited in the present article refer to Australian dollars, the value of which has fluctuated
recently between approximately 0.56 and 0.60 United States dollars.

average purity of heroin seized in Australia increased in the same period, from 44 per cent in the period 1996-1997 to 58 per cent in the period 1999-2000, reaching a peak of 65 per cent in the period 1998-1999 [22]. Such a pattern of increased availability, decreased price and increasing quality is consistent with an expanding market [24]. The illicit drug monitoring systems implemented in Australia in the mid-1990s were able to document the parameters of such growth for the first time.

Evidence of a reduction in the availability of heroin in 2001

Starting at the end of 2000, however, Australia's heroin markets experienced an unexpected and dramatic reduction in the availability of heroin. Unsolicited reports of a heroin shortage came from staff of drug treatment agencies and needle and syringe exchange programmes, as well as researchers in the field. In response to those reports, timely surveys of IDU were conducted in Sydney and Melbourne to examine their veracity [25-28]. In those studies, the great majority of IDU reported a reduction in the availability of heroin, as indexed by significantly increased "search time" (the time taken to successfully obtain drugs), and marked increases in the price of heroin. Most IDU had also perceived a reduction in the purity of heroin, although figures obtained from analysed seizures of heroin are clearly a measure of purity preferable to the subjective impressions of users.

The findings were validated not long afterwards by the Illicit Drug Reporting System (IDRS), Australia's strategic early warning system that has monitored the price, purity, availability and patterns of use of illicit drugs since 1996 [29]. IDRS annually collects comparable and detailed information from a sentinel population of IDU regarding their history and patterns of drug use. The IDRS data make possible a rigourous examination of changes in patterns of drug use because a comparable sample of a sentinel population of IDU, recruited using the same methods and from the same geographical regions over time, are interviewed each year and asked questions regarding their own recent behaviour. Those data thus do not rely on retrospective recall to the extent of the studies cited above.

Consistent with recommendations regarding best practice in the monitoring of drug trends [30], IDRS also triangulates a number of data sources against the quantitative IDU survey to ensure the validity of its findings [5-8, 31]. Comparable quantitative data that demonstrate changes between 2000 and 2001 in the behaviour of IDU are presented below, but it should be noted that all of the trends thus demonstrated were validated through qualitative reports of key informants or experts who, through their work, have regular contact with illicit drug users [32]. Further, in order to be as concise and cohesive as possible, data relating only to New South Wales are presented in the remainder of this article. Data on price and availability suggest that other jurisdictions, particularly Victoria, experienced a more dramatic reduction in heroin availability than New South Wales, a fact that is consistent with law enforcement intelligence indicating that Sydney remained the centre of heroin importation and trafficking in Australia throughout the period 2000-2001 [23]. However, it is reasonable to

focus on New South Wales data given that it is estimated that New South Wales accounts for approximately one half of the heroin users in Australia [33].

IDU recruited for IDRS described the availability of heroin* and recent changes in availability.** Comparison of those results over time (figure II) shows that, in New South Wales (as in all jurisdictions with a viable heroin market), the availability of heroin was dramatically reduced in 2001 compared with 2000 [32]. From 2000 to 2001, there was a marked decline (from 85 per cent to 46 per cent) in the proportion of IDU describing heroin as being "very easy" to obtain and a concomitant increase (from 1 per cent to 16 per cent) in the proportion of IDU describing heroin as being "difficult" or "very difficult" to obtain. Likewise, in 2001, a far greater proportion of the IDU sample reported that heroin had recently been more difficult to obtain (37 per cent in 2001, compared with 7 per cent in 2000) (see figure III).

Figure II.   Proportion of injecting drug users in New South Wales who described heroin as being "very easy" to obtain, 1996-2002
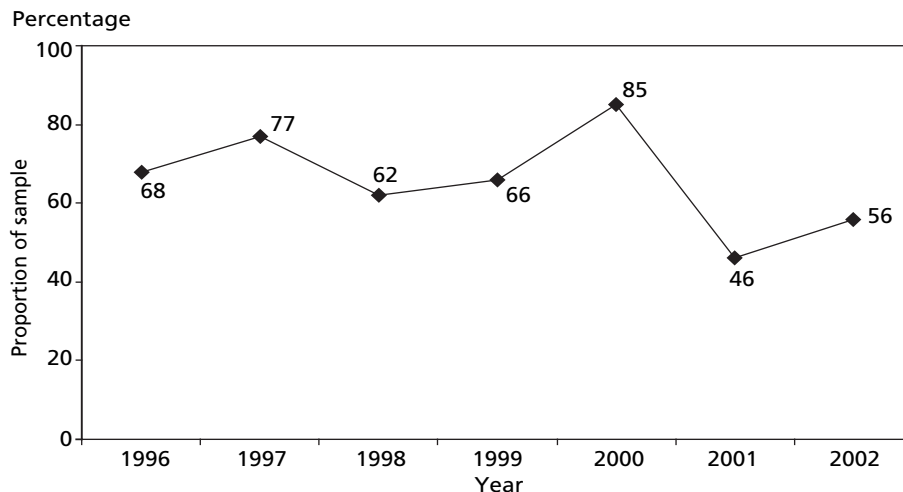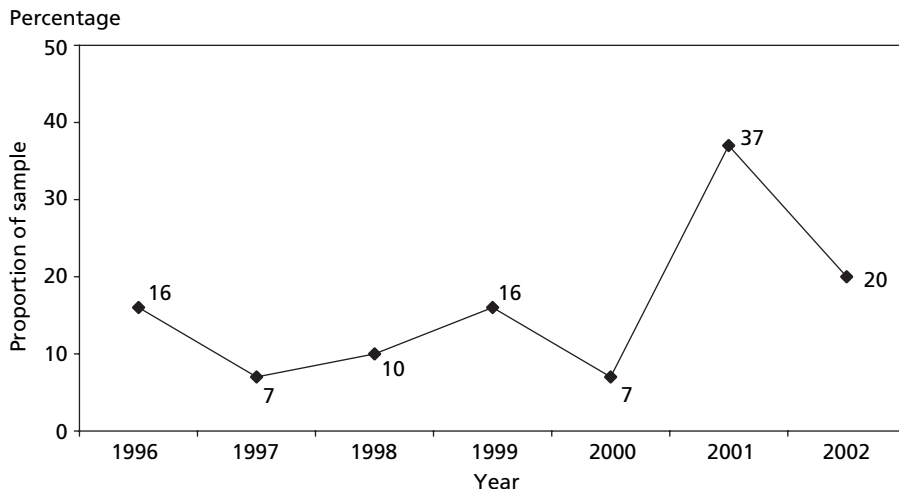

Source: Illicit Drug Reporting System, interviews with injecting drug users.

Assuming that demand is relatively stable, decreased availability should increase prices [34]. Consistent with reports by IDU of a heroin shortage in 2001 were the first increases in price recorded since 1996. Figure IV shows the median price paid between 1996 and 2002 for the last purchase of a gram of heroin among IDU in New South Wales. It also shows that, following a period of stable or decreased prices, the price of a gram of street heroin rose from A$ 220 in 2000 to A$ 320 in 2001.

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*The question asked was "How easy is it to get heroin at the moment?"; the possible response options were "Very easy", "Easy", "Difficult" and "Very difficult".

**The question asked was "Has the availability of heroin changed in the last six months?"; the possible response options were "Easier", "Stable", "More difficult" and "Fluctuates".

Figure III.   Proportion of injecting drug users who reported that heroin had recently been more difficult to obtain, 1996-2002

Source: Illicit Drug Reporting System, interviews with injecting drug users.

Figure IV.   Estimates by injecting drug users of the price of heroin in New South Wales, 1996-2002
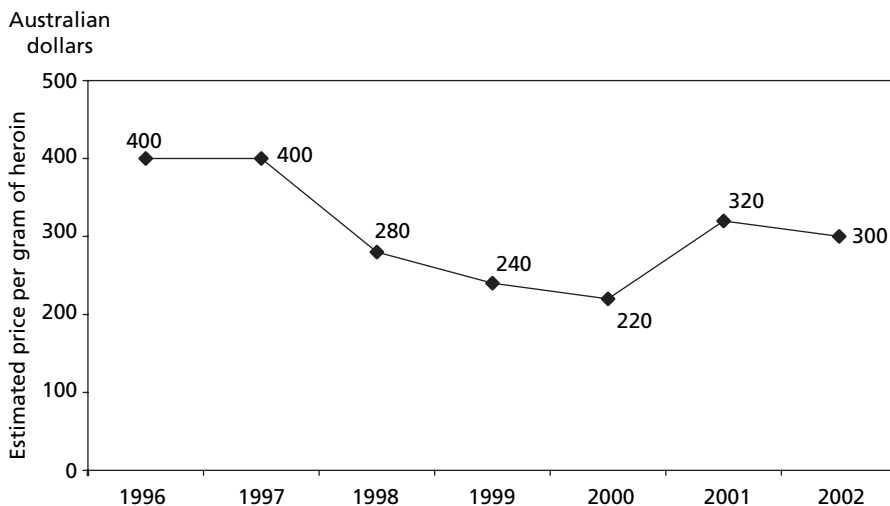
Source: Illicit Drug Reporting System, interviews with injecting drug users.

As would be expected during a period of reduced drug availability, the purity of heroin at the street level declined at around the time of the heroin shortage. Figure V shows the median purity of heroin seized in New South Wales by the New South Wales Police and the Australian Federal Police. Seizures made by the New South Wales Police result from activities ranging from street-level arrests

of suspected users to hauls from targeted operations, whereas seizures made by the Australian Federal Police are more likely to be the result of higher-level intercepts, often at the border. The median purity of heroin seizures made in New South Wales and analysed by the Australian Federal Police has remained relatively stable over time at approximately 70 per cent (see figure V), although during the third and fourth quarters of 2000 it decreased, to approximately 50 per cent [35]. The purity of seizures analysed by the New South Wales Police, however, appears to be more variable, declining from 65 per cent in the second quarter of 2000 to 38 per cent in the third quarter of that year and dropping as low as 28 per cent in the second quarter of 2001. The New South Wales Police data beyond that date have not yet been made available.

Figure V.   Purity of heroin seizures analysed in New South Wales, by quarter, 1999-2003
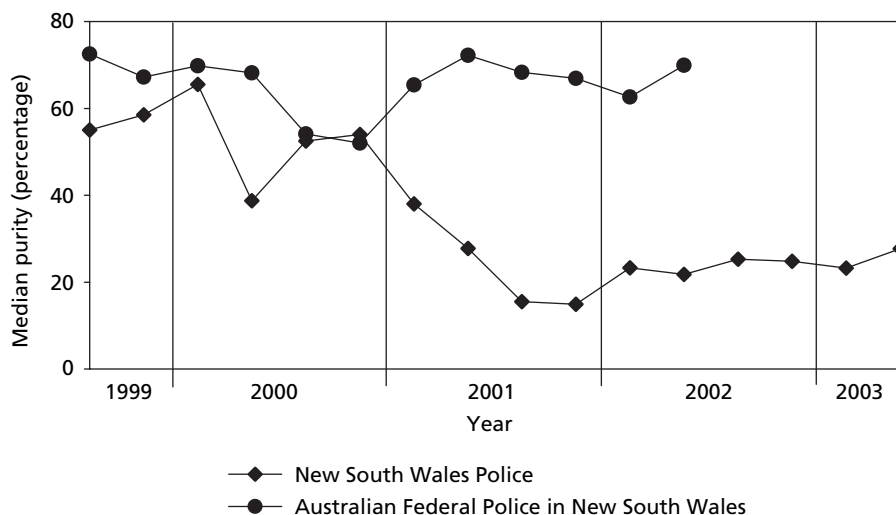
Source: Australian Crime Commission.

Following the 2001 findings of IDRS, the evidence appeared clear: despite reservations about the veracity of initial anecdotal reports, in 2001 illicit drug markets in New South Wales had undergone a fundamental shift in which the availability of heroin, the most widely preferred injectable drug in the state, had suddenly, dramatically and inexplicably decreased.

Short-term changes associated with the reduced availability of heroin

Several short-term changes associated with the reduced availability of heroin have been observed. The data presented below relate to some of those changes, discussed under three broad headings: *(a)* patterns of heroin use; *(b)* health-related outcomes; and *(c)* criminal activity.

Patterns of heroin use

As would be expected during a period of relative shortage of a drug, there were declines in a number of indicators of heroin use between 2000 and 2001. For example, among IDU recruited for the New South Wales IDRS in 2000 and 2001, the median number of days on which heroin had been used in the preceding six months among heroin users declined, from 180 days in 2000 (a figure indicating that more than one half of those who had used heroin in the six months preceding the interview had used on a daily basis during that period) to 158 days in 2001. The proportion of IDU who reported that heroin was the last drug they had injected prior to the interview decreased from 78 per cent in 2000 to 57 per cent in 2001. Similarly, the proportion of the sample who reported that heroin was the drug they had injected most often in the preceding month decreased from 79 per cent in 2000 to 58 per cent in 2001. The proportion of the sample who reported daily heroin use in the preceding six months declined from 49 per cent in 2000 to 41 per cent in 2001, and the proportion who reported that they had used heroin on the day preceding the interview fell from 78 per cent in 2000 to 62 per cent in 2001.

Figure VI.   Reports of heroin being the last drug injected among persons attending a needle and syringe exchange programme in the inner city of Sidney, 1997-2002

Numerous data sources other than IDRS validate the findings of reduced prevalence and frequency of heroin use among IDU. Figure VI shows the findings of a needle and syringe exchange programme conducted in the inner city of Sydney, which routinely records the drugs last injected by participants. Following a steady increase between 1999 and late 2000 in the proportion of

participants who last injected heroin, there was a marked decrease early in 2001, from 71 per cent of participants who last injected heroin in August 2000 to 51 per cent in March 2001. The consistency of a range of data clearly demonstrates that the reduced availability of heroin was associated with a reduction in the prevalence and frequency of heroin injecting among illicit drug users in New South Wales.

Health-related outcomes

This section presents data relating to two notable outcomes of problematic heroin use: treatment for dependence and overdose.

Treatment

Figure VII shows the number of treatment episodes in New South Wales between July 2000 and June 2002 in which opioids were identified as the main drug of concern. The number of episodes of treatment involving detoxification decreased noticeably during the first half of 2001, as did the number of assessment episodes. Overall, this has manifested itself as a reduction in the number of treatment episodes where opioids were the primary drug of concern, a reduction that was sustained until June 2002.

Figure VII.   Opioid treatment episodes in New South Wales, by main treatment type, July 2000-June 2002
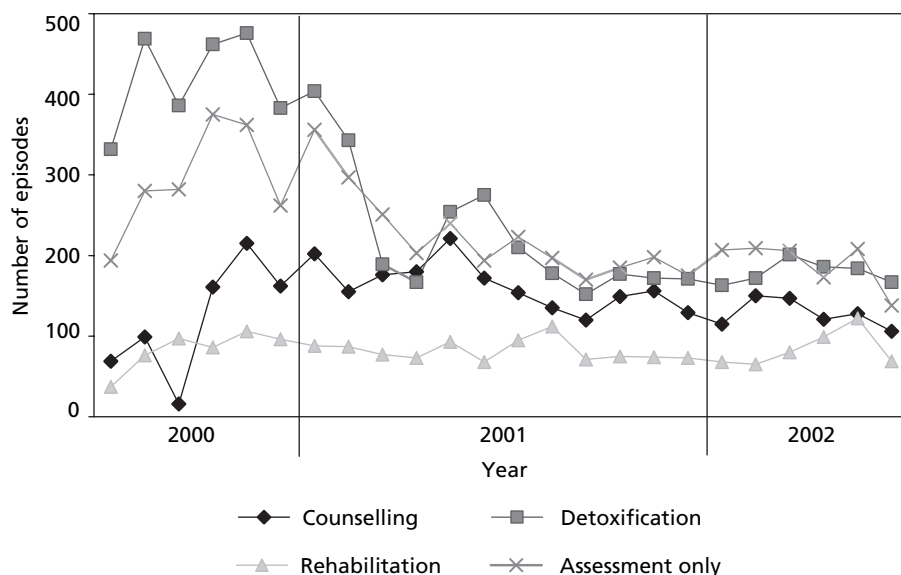
Source: Drug Programs Bureau, New South Wales Health, Australia, National Minimum Data Set.

These findings can be considered complementary to the patterns depicted in figure VIII. Between January 1999 and January 2001, consistent with an increase in the provision of treatment for opioid dependence in New South Wales, there were consistent increases in the number of persons registered for either methadone or buprenorphine maintenance treatment. Between January 2001 and January 2002, the number of persons in maintenance treatment in New South Wales remained relatively stable at around 15,000 persons. From January 2002, the number of opioid maintenance patients again began to increase; thus, in November 2002, there were nearly 16,000 persons enrolled in maintenance treatment in New South Wales. The retention of persons in treatment during the heroin shortage is notable. If the number of opioid-dependent persons has remained fairly stable since 2001 and a higher proportion are enrolled in maintenance treatment, it stands to reason that there would be a decline in demand for other kinds of treatment.

Figure VIII.   Methadone and buprenorphine maintenance patients in New South Wales, January 1999-December 2002
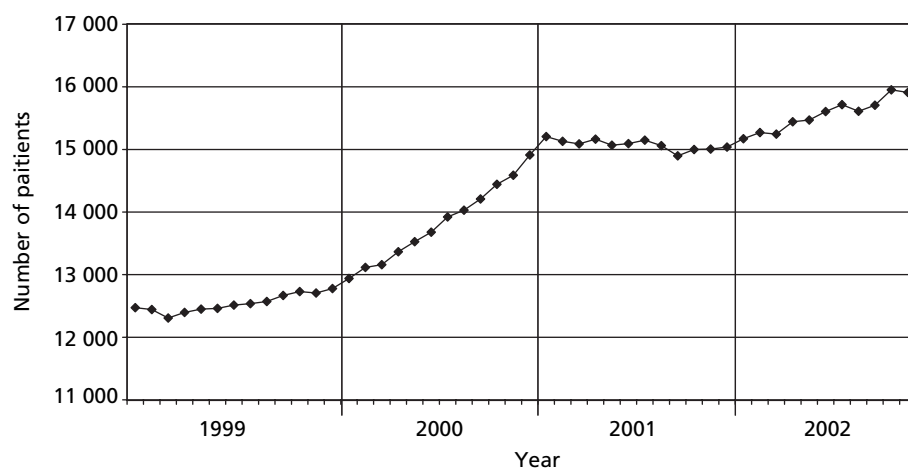
*Source:* Pharmaceutical Services Branch, NWS Health, Australia.

The findings relating to a decrease in the number of treatment episodes during a period of reduced drug availability may appear counter-intuitive; many suggested at the time of the heroin shortage that demand for treatment would increase. However, it may be the case that, as a result of decreased heroin purity and enforced reductions in prevalence and frequency of use, heroin users were simply not as physically dependent on the drug as they may have been during periods in which heroin was relatively abundant and, as a result, the need for treatment was not as great. As the number of people enrolled in maintenance

treatment increased throughout 2002, data relating to other types of treatment episodes throughout the whole of 2002 are eagerly awaited; however, at least in the first half of the year, the number of such treatment episodes did not appear to increase.

Overdose

Figure IX shows the number of callouts by the Ambulance Service of New South Wales to suspected opioid overdoses between May 1995 and June 2002, an indicator with demonstrated sensitivity to heroin use and associated problems [36]. Starting in January 2001, there were dramatic and consistent decreases in the number of ambulance callouts per month. During June 2001, the number of callouts was lower than the number recorded in 1995. As would be expected if heroin had become less available, the number of people requiring medical assistance for opioid overdose decreased.

Figure IX.   Ambulance callouts to suspected opioid overdoses in New South Wales, May 1995-June 2002
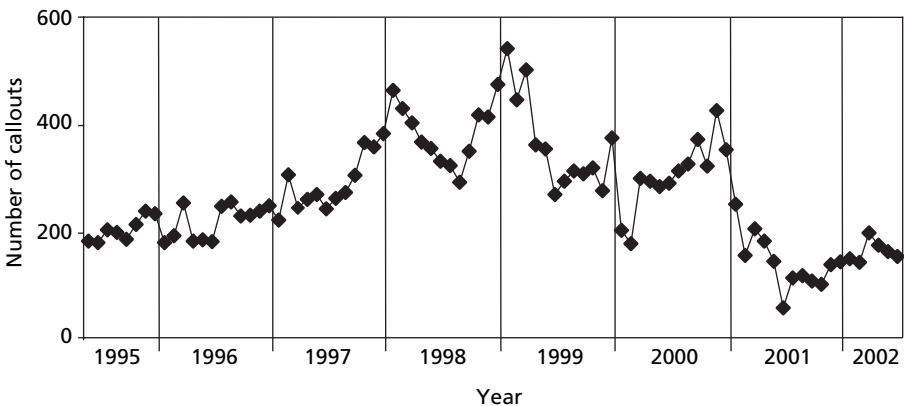
Source: Ambulance Service of New South Wales, Australia.

Summary of health-related outcomes

The two health-related outcomes discussed in this section suggest that there were significant health benefits to heroin users in at least some domains as a result of the heroin shortage. The demand for treatment for opioid dependence was not as great as during periods in which heroin was relatively abundant, which suggests that the severity of opioid dependence among heroin users decreased as a result of the shortage. Further, the number of persons experiencing opioid overdoses decreased. That is likely to be a consequence of decreased prevalence and frequency of heroin use and significant polydrug use, as well as decreased heroin purity [37-40].

Criminal activity

Heroin possession and use

The number of New South Wales Police incidents involving heroin possession or use that were recorded between 1997 and 2002 is shown in figure X. In early 2001, incidents involving heroin possession or use declined rapidly and stabilized at a lower level for the remainder of 2001 and at least the first part of 2002. That decrease appears to have been an extension of a steady reduction that was first recorded in the last half of 1999. There are, of course, difficulties in identifying changes in drug user behaviour based solely on police data, because such data can reflect changes in law enforcement resources and strategies, as well as changes in criminal activity. However, the data from 2001 onwards are consistent with the reports by IDU of changes in patterns of drug use, which are discussed in the preceding section.

Figure X.   Incidents involving heroin possession or use recorded by New South Wales Police, 1997-2002

Source: Bureau of Crime Statistics and Research, Attorney-General's Department of New South Wales, Australia.

Summary of criminal activity

The two types of criminal activity discussed in the present section suggest that the levels of some types of criminal activity will decrease during a period of reduced drug availability; the number of incidents involving both heroin possession and use and heroin dealing and trafficking decreased during the first

half of 2001, concomitant with the shortage. However, the number of incidents involving both classes of crime also appeared to decrease in the second half of 1999.

Current research into the causes, effects and implications of the reduced availability of heroin

An 18-month programme of research into the causes, effects and implications of the heroin shortage is currently being coordinated by the National Drug and Alcohol Research Centre in three Australian jurisdictions (New South Wales, Victoria and South Australia). The research, which is being funded by the National Drug Law Enforcement Research Fund of Australia, involves the following:

   (a) Interviews are completed with two groups of IDU entering methadone or buprenorphine maintenance treatment: one group entering before the heroin shortage occurred, and one group entering during the period of the shortage. The IDU are compared for their current levels of functioning to determine whether there are any differences between the two groups in terms of current functioning and drug use. They are also asked about the heroin shortage, and their reasons for entering treatment when they did;

   (b) Interviews are completed with key informants from both health and law enforcement agencies. The key informants have been selected on the basis of their knowledge and experience at a number of levels within the health and law enforcement bureaucracies;

   (c) Analyses are completed of indicator data related to health and law enforcement consequences of drug use and of data related to seizures and law enforcement activity;

   (d) An examination is carried out of protected information from law enforcement agencies at the state and federal levels regarding the nature of illicit drug markets, activity within different markets before, during and after the heroin shortage and information regarding operational law enforcement activity.

   The findings of the project will be published in 2004 (see the web site of the National Drug and Alcohol Research Centre (www.ndarc.unsw.edu.au)). A number of events have been hypothesized as being the causes of the heroin shortage in Australia. Evidence to assess the support for those hypotheses is currently being systematically collected and evaluated as part of an ongoing project. More details are to be made available pending the results of research being conducted at the National Drug and Alcohol Research Centre.

Caveats

The heroin shortage in Australia has attracted extensive international attention; other countries may be somewhat envious of the reduced availability of a drug that is associated with a disproportionate amount of the total harm related to

illicit drugs [21]. There is no doubt that there were benefits of the heroin short-age, particularly in terms of the health of heroin users (including a significant decrease in the rate of opioid overdose) and reductions in heroin-related crimi-nal activity. Whatever factor or combination of factors the above-mentioned research demonstrates to have caused or contributed to the reduction in heroin availability, both the health and law enforcement sectors may justly take pride in their achievements, and the Australian Government's approach to drug issues through its National Drug Strategy, including the significant increase in fund-ing provided through its National Illicit Drug Strategy, will again be justified.

It should be kept in mind that in no other contemporary illicit drug market has the availability of heroin undergone such a sustained reduction. This is the first empirical evidence of the consequences of such a shortage. For this reason, the intuitive assumption that any reduction in drug use can be equated with a reduction in the overall level of drug-related adverse health and social conse-quences (the approach underpinning the National Drug Strategy) warrants care-ful contemplation. In this section, some perspective on the heroin shortage is provided by a consideration of three aspects to it: *(a)* evidence of a shift to patterns of other drug use among some primary heroin users; *(b)* the duration of the shortage; and *(c)* an estimation of the proportion of the total world heroin market accounted for by Australia.

Drug substitution among heroin users

Although there was a clear reduction in the prevalence and frequency of heroin use during 2001, there was some evidence of drug substitution among those who remained in the market. For example, data relating to cocaine use are considered. There was a substantial increase in the proportion of persons in the New South Wales IDRS sample reporting recent cocaine use in 2001 (84 per cent, compared with 63 per cent in 2000); and in the median number of days on which they had used it in the preceding six months (90 days in 2001, compared with 12 days in 2000). Similarly, there were marked increases in the proportion of IDU who reported that cocaine was the drug they had most recently injected (from 11 per cent in 2000 to 37 per cent in 2001) and the drug they had injected most often in the preceding month (from 9 per cent in 2000 to 34 per cent in 2001). Although some have found a shift from a depress-ant to a stimulant counter-intuitive, an association between heroin and cocaine use has been noted in other countries [41, 42]. The shift could perhaps have been predicted to some extent in Sydney as a result of the marked increased in 1998 in cocaine injection among primary heroin users that has been sustained since that time [5].

Data sources other than IDRS are consistent in suggesting that at least some IDU in Sydney shifted to cocaine injection in the face of reduced heroin avail-ability. Figure XI shows the close relationship between use of the two drugs among persons attending a needle and syringe exchange programme in Sydney.

Figure XI.   Reports of heroin or cocaine being the last drug injected among persons attending a needle and syringe exchange programme in the inner city of Sydney, 1997-2002
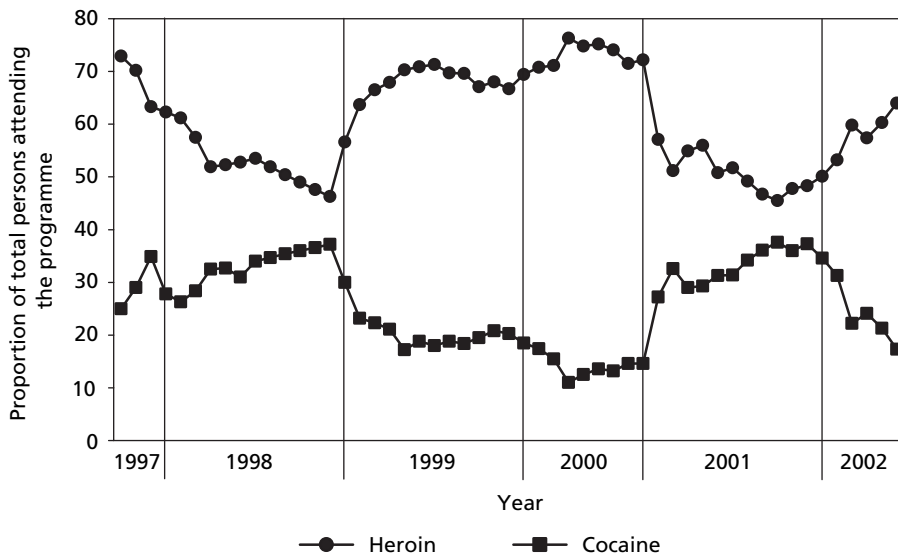

Similarly, there appears to be at least some relationship between the number of criminal incidents involving heroin and those involving cocaine (see figures XII and XIII), whereby the two types of crime appeared to mirror each other more closely from the beginning of 2001. In early 2001, incidents for heroin possession or use declined rapidly; in the same months, there was a con-comitant increase in incidents related to cocaine possession or use (see figure XII). A similar pattern is evident for dealing or trafficking in cocaine: in early 2001, the number of incidents related to dealing or trafficking in cocaine increased; at the same time, the number of incidents related to dealing or trafficking in heroin decreased (see figure XIII).

With respect to the substitution of only one drug for heroin among primary heroin users, the above-mentioned data, despite being limited to the findings of a single jurisdiction, emphasize that it is simplistic to assume that, if heroin is made less available, then there will be a consequent reduction in net drug-related harm. The 2001 national IDRS (which takes into account the results from all eight Australian jurisdictions) documented shifts to other drugs among primary heroin users in all jurisdictions that had viable heroin markets prior to the shortage. The shifts included increases in the injection of illicit methamphetamine, pharmaceutical opioid preparations, such as morphine and pethidine, and non-injectable pharmaceuticals, such as methadone syrup and benzodiazepines [32]. When assessing the benefits of the heroin shortage, it is important to take into account such shifts, particularly in Australia, where the treatment and intervention system is primarily designed to accommodate opiate use, dependence and harm [1].
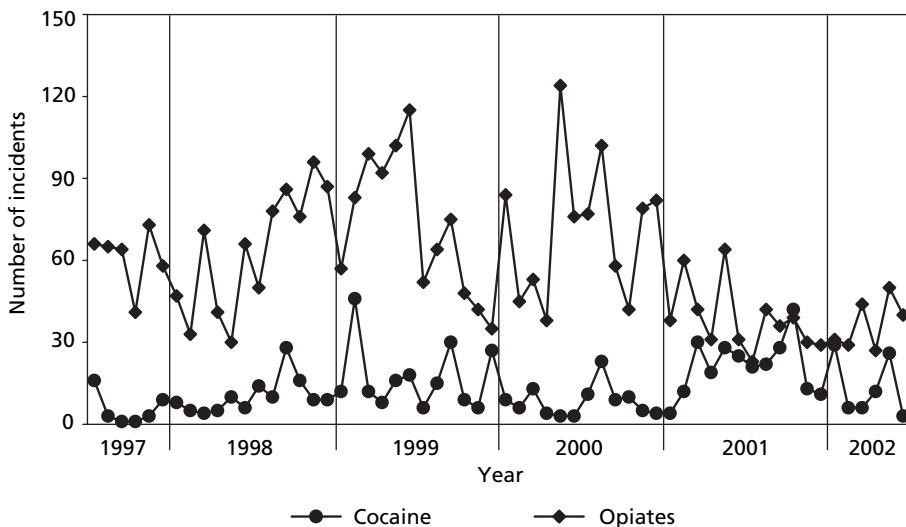
Figure XII. **Incidents recorded by the New South Wales Police involving possession or use of cocaine and opiates, 1997-2002**
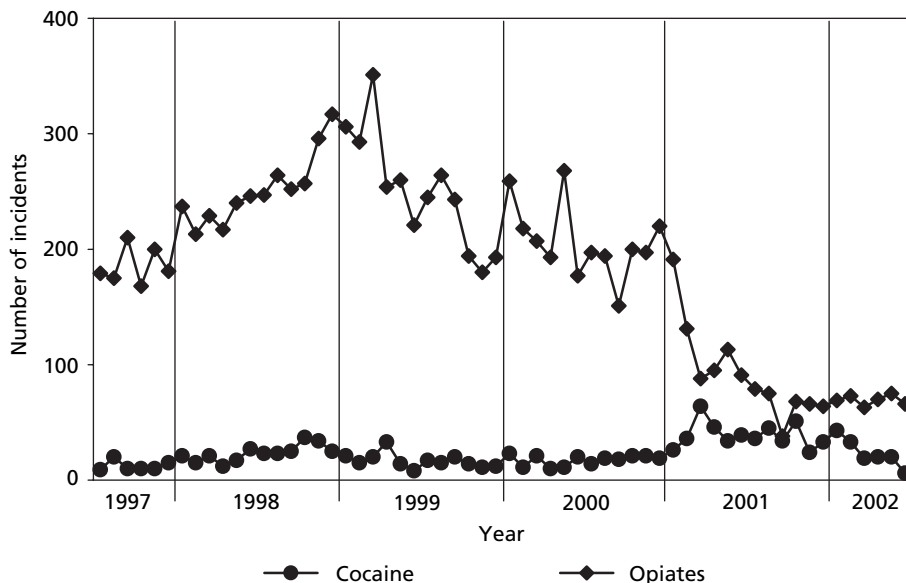
Source: Bureau of Crime Statistics and Research, Attorney-General's Department of New South Wales, Australia.

Figure XIII. **Incidents recorded by the New South Wales Police involving dealing or trafficking in cocaine and opiates, 1997-2002**

Source: Bureau of Crime Statistics and Research, Attorney-General's Department of New South Wales, Australia.

Such findings emphasize an important point: the overall net harm resulting from illicit drug use may not have altered to the same extent as the reduction in heroin use. The substitution of other drugs for heroin may make the net harm that occurs similar over time. For example, one consequence of the heroin shortage may have been that cocaine use became a more normative behaviour among some heroin injectors. Both Australian [5, 43] and international [44-49] research has consistently documented higher levels of harm among cocaine injectors than among other IDU. Cocaine injection is associated with a number of undesirable outcomes, including more frequent injection, higher levels of injection-related health problems, more frequent sharing of injecting equipment, greater sexual risk-taking, poorer health, higher HIV seroprevalence, increased criminality and striking rates of psychiatric comorbidity [50]. Given the consistency of the findings of huge levels of harm accruing to cocaine injectors, it must be considered that any benefits obtained from the reduction in heroin availability may be partly offset by the use of other drugs, including cocaine.

Duration of the heroin shortage

The global implications of the heroin shortage must also be considered in terms of the duration of the shortage. There is no doubt that the shortage was a reliable and valid phenomenon and that it was accompanied by increased prices, decreased purity, changes in patterns of drug use and a range of changes in health and criminal activity outcomes. Although data indicate that the availability of heroin has not returned to its pre-2001 levels, it is equally clear that the peak period of the shortage was relatively brief.

Australia's share of global heroin consumption

When reflecting on the global implications of the heroin shortage in Australia, some perspective is provided by consideration of the proportion of total world heroin consumption accounted for by the Australian heroin market. It is difficult to develop reliable estimates of heroin consumption, and any attempt to do so must inevitably be considered with an appropriate degree of caution. However, it is also reasonable to argue that it is possible to derive estimates that are at least indicative. In Global Illicit Drug Trends 2001 [51], a report prepared by the former Office for Drug Control and Crime Prevention (now called the United Nations Office on Drugs and Crime) that provides seizure figures from around the world, it is stated that, in 1999, seizures of heroin made in Oceania (Australia and New Zealand), the great majority of which were made in Australia, accounted for 1.1 per cent of total world heroin (and morphine) seizures. The total weight of heroin seized throughout the world in 1999 was 36,200.48 kilograms. In addition, it is estimated in the report that, in the same year, the interdiction rate (the quantity seized divided by the quantity produced) for opiates was 15 per cent. Together, the two figures can be used as the basis for estimating that a

total of approximately 241,336.5 kilograms of heroin were produced (100/15 x 36,200.48) in 1999. If the assumption is made that the total produced is equal to the total consumed and if the upper estimate of the former National Crime Authority (which has been integrated with two other agencies to form the Australian Crime Commission) [52] of the amount of heroin consumed per annum in Australia (8,000 kilograms) is accepted as valid, it can be calculated that Australia accounts for approximately 3.3 per cent of total world heroin consumption. Alternatively, if it is assumed that seizures reflect market activity, the estimate of the United Nations Office on Drugs and Crime [53] suggests that Australia accounts for approximately 1 per cent of the global heroin market.

When Australia's proportionate role in the world heroin market is considered in this fashion, the global implications of Australia's heroin shortage can be considered within the appropriate perspective. There is no doubt that, although Australia has high rates of heroin consumption relative to countries in western Europe and the Americas [51]; with a total population of fewer than 20 million people, Australia accounts for a tiny share of the total world heroin market, the absolute upper limit being 3 per cent and a more reasonable estimate being 1 per cent.

Supply reduction, demand reduction and value for money

The monetary cost of reducing consumption by policing and customs must be viewed with the cost of successful strategies implemented in Australia to reduce demand. In Australia, 35-45 per cent of all opioid-dependent persons are in treatment at any point in time, mainly in detoxification, in pharmacotherapy treatment with methadone, buprenorphine and naltrexone and in residential rehabilitation [54]. In other countries, it is estimated that up to 80 per cent of the heroin-dependent population is in treatment. There is reason to believe that the reduction in heroin use is significant in detoxification and rehabilitation and within opioid pharmacotherapy [55]. If one third of heroin consumption is obviated by virtue of such treatment, the role of demand reduction is both marked and sustainable.

Technical challenges

The technical challenges involved in monitoring illicit drugs to obtain a better understanding of the nature of fluctuations in their availability are implicit in the arguments presented above. The challenges include developing methods to systematically document, survey or study:

(a) Local production processes and yields of various illicit drugs in source countries;

(b) The importation processes;

(c) Seizures occurring at borders and at the street level;

(d) The organization of high-level drug markets and how people enter and work in those markets;

(e) The price, purity and availability of illicit drugs.

Whether countries, especially developing countries, can develop such technical capacities will depend on the investment made.

Conclusions

Australia has succeeded in reducing the supply of heroin within its territory. The reduction does not appear to be attributable to reduced production in Afghanistan or Myanmar. It may be attributable to policing action deterring the importation of heroin into Australia, possibly by making existing importers view other markets more favourably or by reducing the number of importers through compromising the operations of trafficking syndicates. The reasons for the shortage are still being studied, and the extent to which the change in heroin supply is reliable and replicable remains to be documented.

In the face of a marked reduction in the availability of the preferred drug of the majority of IDU in Australia, the implications of the potential for fundamental shifts in the use of different illicit drugs must be considered. There is a need to increase the accessibility of interventions designed for users of illicit drugs other than heroin and to provide training for frontline workers who have limited experience dealing with such users. In Australia, governments at all levels have recognized that stimulant use, dependence and related harm have been identified as priority areas for funding and further research. The extent of stimulant-related research, as well as training for health and law enforcement professionals, currently being conducted in Australia should ensure that the treatment and intervention system is better equipped to accommodate the differential harm associated with stimulants as opposed to opiates. Whether the supply of heroin will return to its pre-2001 levels (and the impact that that may have on patterns in the use of heroin, stimulants and other drugs) remains to be seen. The heroin shortage constituted a unique natural experiment that demonstrated the importance of continued routine documentation of changes in patterns of illicit drug use so that policy makers may respond appropriately to the demands of dynamic and evolving illicit drug markets.

References

1. L. Topp, C. Day and L. Degenhardt, "Changes in patterns of drug injection concurrent with a sustained reduction in the availability of heroin in Australia", *Drug and Alcohol Dependence*, vol. 70, No. 3 (2003), pp. 275-286.

2. European Monitoring Centre for Drugs and Drug Addiction, *Annual Report on the State of the Drugs Problem in the European Union 2000* (Luxembourg, Office for Official Publications of the European Communities, 2000).

3. C. Fry and L. Topp, "Illicit drug trends in Australia", *Global Workshop on Drug Information Systems: Activities, Methods and Future Opportunities*, Vienna, 3-5 December 2001 (2002), pp. 38-41.

4. F. Shand and others, "The monitoring of drug trends in Australia", *Drug and Alcohol Review*, vol. 22, No. 1 (2003), pp. 61-72.

5. S. Darke, S. Kaye and L. Topp, "Cocaine use in New South Wales, Australia, 1996-2000: 5 year monitoring of trends in price, purity, availability and use from the illicit drug reporting system", *Drug and Alcohol Dependence*, vol. 67, No. 1 (2002), pp. 81-88.

6. S. Darke and others, "Heroin use in New South Wales, Australia, 1996-2000: 5 year monitoring of trends in price, purity, availability and use from the Illicit Drug Reporting System (IDRS)", *Addiction*, vol. 97, No. 2 (2002), pp. 179-186.

7. S. Darke, L. Topp and J. Ross, "The injection of methadone and benzodiazepines among Sydney injecting drug users 1996-2000: 5-year monitoring of trends from the Illicit Drug Reporting System", *Drug and Alcohol Review*, vol. 21, No. 1 (2002), pp. 27-32.

8. L. Topp and others, "The emergence of potent forms of methamphetamine in Sydney, Australia: a case study of the IDRS as a strategic early warning system", *Drug and Alcohol Review*, vol. 21, No. 4 (2002), pp. 341-348.

9. N. Blewett, *National Campaign against Drug Abuse: Assumptions, Arguments and Aspirations*, NCADA Monograph No. 1 (Canberra, Australian Government Publishing Service, 1987).

10. *The National Campaign against Drug Abuse 1985-1988: Evaluation and Future Directions*, NCADA Monograph No. 12 (Canberra, Australian Government Publishing Service, 1989).

11. G. Bammer and others, "Harm minimization in a prohibition context: Australia", *Annals of the American Academy of Political and Social Science*, special issue, vol. 582, 2002, pp. 80-93.

12. J. Fitzgerald and T. Sewards, *Drug Policy: the Australian Approach*, ANCD Research Paper No. 5 (Canberra, Australian National Council on Drugs, 2002).

13. Australia, Ministerial Council on Drug Strategy, *National Drug Strategic Framework 1998-99 to 2002/03: Building Partnerships: a Strategy to Reduce the Harm Caused by Drugs in Our Community* (Canberra, 1998).

14. E. Single and T. Rohl, *The National Drug Strategy: Mapping the Future: an Evaluation of the National Drug Strategy 1993-1997* (Canberra, Australian Government Publishing Services, 1997).

15. W. Hall, L. Degenhardt and M. Lynskey, "Opioid overdose mortality in Australia, 1964-1997: birth-cohort trends", *Medical Journal of Australia*, vol. 171, No. 1 (1999), pp. 34-37.

16. W. Hall, M. Lynskey and L. Degenhardt, "Trends in opiate-related deaths in the United Kingdom and Australia, 1985-1995", *Drug and Alcohol Dependence*, vol. 57, No. 3 (2000), pp. 247-254.

17. M. MacDonald, M. Robotin, and L. Topp, "Drug use trends among injecting drug users (IDU): findings from the Australian Needle and Syringe Program (NSP) Survey, 1995-2000, *Drug Trends Bulletin* (Sydney), October 2001.

18. R. Bruno and S. McLean, *Tasmanian Drug Trends 2000: Findings from the Illicit Drug Reporting System (IDRS)*, NDARC Technical Report No. 109 (Sydney, National Drug and Alcohol Research Centre, 2001).

19. B. O'Reilly and P. Rysavy, *Northern Territory Drug Trends 2000: Findings of the Illicit Drug Reporting System*, NDARC Technical Report No. 104 (Sydney, National Drug and Alcohol Research Centre, 2001).

20. S. Darke, W. Hall and L. Topp, *The Illicit Drug Reporting System (IDRS) 1996-2000*, NDARC Technical Report No. 101 (Sydney, National Drug and Alcohol Research Centre, 2000).

21. W. Hall, M. Lynskey and L. Degenhardt, *Heroin Use in Australia: Its Impact on Public Health and Public Order*, NDARC Monograph No. 42 (Sydney, National Drug and Alcohol Research Centre, 1999).

22. L. Topp and others, *Australian Drug Trends 2000: Findings of the Illicit Drug Reporting System (IDRS)*, NDARC Monograph No. 47 (Sydney, National Drug and Alcohol Research Centre, 2001).

23. Australian Bureau of Criminal Intelligence, *Australian Illicit Drug Report 2000-01* (Canberra, 2002).

24. J. P. Caulkins and P. Reuter, "What price data tell us about illicit drug markets", *Journal of Drug Issues*, vol. 28, No. 3 (1998), pp. 593-612.

25. C. Day and others, "Decreased heroin availability in Sydney in early 2001", *Addiction*, vol. 98, No. 1 (2003), pp. 93-95.

26. P. Dietze and others, "The heroin drought in Melbourne: indicators, behaviour changes, impacts and return to supply", paper presented to the 13th International Conference on the Reduction of Drug-Related Harm, Ljubljana, 3-7 March 2002.

27. P. Miller, C. Fry and P. Dietze, *A Study of the Impact of the Heroin "Drought" in Melbourne: Results of the Drug Availability Monitoring Project (DAMP)* (Melbourne, Turning Point Alcohol and Drug Centre, 2001).

28. D. Weatherburn and others, "Supply control and harm reduction: lessons from the Australian heroin 'drought'", *Addiction*, vol. 98, No. 1 (2003), pp. 83-91.

29. J. Hando and others, "The development of an early warning system to detect trends in illicit drug use in Australia: the Illicit Drug Reporting System", *Addiction Research*, vol. 6, 1998, pp. 97-113.

30. P. Griffiths and others, "Drug information systems, early warning and new drug trends: can drug monitoring systems become more sensitive to emerging trends in drug consumption?", *Substance Use and Misuse*, vol. 35, Nos. 6-8 (2000), pp. 811-844.

31. L. Topp and R. McKetin, "Supporting evidence-based policy-making: a case study of the Illicit Drug Reporting System in Australia", *Bulletin on Narcotics* (United Nations publication), vol. LV, Nos. 1 and 2 (2003), pp. 23-30.

32. L. Topp and others, *Australian Drug Trends 2001: Findings of the Illicit Drug Reporting System (IDRS)*, NDARC Monograph No. 48 (Sydney, National Drug and Alcohol Research Centre, 2002).

33. W. Hall and others, "How many dependent heroin users are there in Australia?", *Medical Journal of Australia*, vol. 173, No. 10 (2000), pp. 528-531.

34. R. J. MacCoun and P. Reuter, *Drug War Heresies: Learning from Other Vices, Times, and Places* (Cambridge, Cambridge University Press, 2001).

35. Australian Crime Commission, *Australian Illicit Drug Report 2001-02* (Canberra, 2003).

36. L. Degenhardt, W. Hall and B.-A. Adelstein, "Ambulance calls to suspected over-doses: New South Wales patterns July 1997 to June 1999", *Australian and New Zealand Journal of Public Health*, vol. 25, No. 5 (2001), pp. 447-450.

37. P. O. Coffin and others, "Opiates, cocaine and alcohol combinations in accidental drug overdose deaths in New York City, 1990-98", *Addiction*, vol. 98, No. 6 (2003), pp. 739-747.

38. S. Darke and others, "Fluctuations in heroin purity and the incidence of fatal heroin overdose", *Drug and Alcohol Dependence*, vol. 54, No. 2 (1999), pp. 155-161.

39. S. Darke and D. Zador, "Fatal heroin 'overdose': a review", *Addiction*, vol. 91, No. 12 (1996), pp. 1765-1772.

40. M. Warner-Smith and others, "Heroin overdose: causes and consequences", *Addiction*, vol. 96, No. 8 (2001), pp. 1113-1125.

41. D. M. Hartel and others, "Patterns of heroin, cocaine and speedball injection among methadone maintenance patients: 1978-1988", *Addiction Research*, vol. 4, 1996, pp. 323-340.

42. J. A. Inciardi and L. D. Harrison, eds., *Heroin in the Age of Crack Cocaine* (Thousand Oaks, California, Sage Publications, 1998).

43. I. van Beek, R. Dwyer and A. Malcolm, "Cocaine injecting: the sharp end of drug-related harm!", *Drug and Alcohol Review*, vol. 20, No. 3 (2001), pp. 333-342.

44. D. A. Bux, R. J. Lamb and M. Y. Iguchi, "Cocaine use and HIV risk behaviour in methadone maintenance patients", *Drug and Alcohol Dependence*, vol. 37, No. 1 (1995), pp. 29-35.

45. R. E. Chaisson and others, "Cocaine use and HIV infection in intravenous drug users in San Francisco", *Journal of the American Medical Association*, vol. 261, No. 4 (1989), pp. 561-565.

46. A. J. Giannini and others, "Cocaine-associated violence and relationship to route of administration", *Journal of Substance Abuse Treatment*, vol. 10, No. 1 (1993), pp. 67-69.

47. R. Hudgins, J. McCusker and A. Stoddard, "Cocaine use and risky injection and sexual behaviours", *Drug and Alcohol Dependence*, vol. 37, No. 1 (1995), pp. 7-14.

48. J. J. Platt, *Cocaine Addiction: Theory, Research and Treatment* (Cambridge, Massachusetts, Harvard University Press, 1997).

49. E. E. Schoenbaum and others, "Risk factors for human immunodeficiency virus infec-tion in intravenous drug users", *New England Journal of Medicine*, vol. 321, No. 13 (1989), pp. 874-879.

50. C. S. Tutton and J. W. Crayton, "Current pharmacotherapies for cocaine abuse: a review", *Journal of Addictive Diseases*, vol. 12, No. 2 (1993), pp. 109-127.

51. *Global Illicit Drug Trends 2001* (United Nations publication, Sales No. E.01.XI.11).

52. Australia, National Crime Authority, *National Crime Authority Commentary 2001* (Canberra, 2001).

53. United Nations International Drug Control Programme, *Global Impact of the Ban on Opium Production in Afghanistan* (Vienna, November 2001).

54. F. Shand and R. P. Mattick, *Clients of Treatment Service Agencies: May 2001 Census Findings*, National Drug Strategy Monograph No. 47 (Canberra, Australian Government Publishing Service, 2002).

55. R. P. Mattick and W. Hall, eds., *A Treatment Outline for Approaches to Opioid Dependence: Quality Assurance Project*, National Drug Strategy Monograph No. 21 (Canberra, Australian Government Publishing Service, 1993).