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**Estimating the economic consequences of a
reduced heroin supply in Australia 2000-2003**

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ESTIMATING THE ECONOMIC CONSEQUENCES OF A REDUCED HEROIN SUPPLY IN AUSTRALIA 2000-2003

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	5
TABLE OF CONTENTS	7
EXECUTIVE SUMMARY	9
INTRODUCTION	13
Effects of the heroin shortage	14
Were there changes in economic costs?	14
Principles of economic evaluation.....	15
Types of economic evaluations.....	15
Non-economic evaluations	16
Framework for an economic evaluation	18
Stating the question.....	18
Perspective of the evaluation.....	18
Identify, measure and value resource use	19
Identify and measure outcomes	20
EVALUATING THE HEROIN SHORTAGE FROM AN ECONOMIC PERSPECTIVE	22
Identify the program, the alternative and state the question	22
Choosing the perspective	23
Identifying and valuing the resources used to reduce heroin supply	23
Identifying the consequences of problematic illicit drug use	24
Issues to consider	25
Measuring costs and consequences	26
CONCLUSION	27
REFERENCES	28

EXECUTIVE SUMMARY

Effects of the heroin shortage

In 2001, a heroin shortage began in New South Wales that was accompanied by a reduction in heroin injecting among injecting drug use (IDU), in favour of an increase in cocaine and possibly methamphetamine injecting. Fatal and non-fatal heroin overdoses substantially decreased, more so in younger than older IDU and there were no offsetting increases in non-fatal overdoses involving cocaine, methamphetamine or benzodiazepines. There was a sustained decline in injecting drug use and a short-lived increase in property crime in NSW, followed by a sustained reduction in such offences. Treatment seeking among older heroin users and treatment compliance improved slightly during the heroin shortage but neither of these changes was sustained.

Were there changes in economic costs?

An obvious policy question is: what were the economic implications of these changes brought about by the reduction in heroin supply? Measuring the economic impact of the reduction in the availability of heroin use, while complex, is only part of the answer. We first need to agree on: (1) the program that produced the shortage and estimate; (2) what it cost by comparison with (3) with the costs of the program that existed status quo ante. We would also need to estimate the costs of the consequences of heroin and other drug use; and the benefits of the decreased availability of heroin.

There are a number of types of economic evaluations that could be used to undertake this task. These can, primarily be classified into two types of analysis: cost-effectiveness analyses and cost-benefit analyses. Other types of evaluation, such as cost-utility and cost-minimisation can be regarded as special cases of cost-effectiveness analysis.

Framework for an economic evaluation

The key steps in conducting an economic evaluation of the heroin shortage are identifying the programs that are being compared and clearly specifying the changes in the costs and outcomes. We also need to indicate from whose perspective the costs and benefits are being quantified. A full evaluation of social costs for instance, would include direct, indirect or intangible costs affecting a number of different groups including drug users, non-users, or government. The costs and outcomes included in the evaluation must reflect the chosen perspective.

The next steps are to identify the type of resources used in each alternative program, to measure them, and to cost the resources used. We also need an outcome measure that represents either a final or intermediate outcome from the resources used. Examples of possible outcome measures include lives (or life years) saved, cases prevented, drug seizures, or some other measure of decreased heroin availability.

Evaluating the heroin shortage from an economic perspective

In this section of the report, we outline one possible approach to measuring the costs and outcomes of achieving the observed decrease in heroin supply. We also discuss some of the issues involved in undertaking and the likely limitations of such an evaluation.

The major difficulty in evaluating the economic impact of the shortage is in identifying the program/s that produced the heroin shortage. An increased budget for drug law enforcement efforts to reduce the importation of heroin may have had an impact on heroin supply but other events may also have played a significant role. These other factors are difficult to identify and quantify; if they cannot be identified, any evaluation runs the risk of omitting these costs.

The choice of a perspective for the economic evaluation depends on what program we believe was responsible for the heroin shortage. A narrow departmental perspective (for instance, from the perspective of the Australian Federal Police) would exclude the costs of any resulting changes in drug use and treatment costs. A governmental perspective would be slightly broader, and a societal perspective would be broader still. If the direct causes of the Australian heroin shortage included events that occurred beyond Australia's borders, then even a societal perspective would be too narrow.

A second challenge is identifying and estimating the costs of the alternative policy, that is, status quo in the absence of a heroin shortage.

Other major challenges in assessing the economic impact of the heroin shortage include: specifying the length of the shortage; identifying the full range of consequences of drug use; noting which of these consequences we can measure (such as emergency department admissions for the consequences of various drugs); choosing a level (eg: local or state) at which to measure these consequences; and noting whether the price of drugs has also changed.

Discussion

After specifying the framework for an economic evaluation we found that we were not able to quantify all of the consequences of drug use. In some cases we were able to estimate some outcomes (for example, the costs of hospital admissions for overdose and drug-induced psychosis), but we are unable to make estimates for areas where the data were too sparse or not available (for example, risky injection practices and their consequences). Even those consequences that were measurable may be subject to bias so that comparisons could not be clearly made between the situation resulting from the heroin shortage and that occurring in the status quo ante. An example of this is the fact that existing health surveillance data are biased towards providing better information about harms caused by heroin rather than psycho stimulant use in Australia in a period in which the use of psycho stimulants increased.

The major obstacle to an economic analysis was the impossibility of estimating which programs were responsible for the reduction in heroin supply and what they cost. If we assume that drug law enforcement (DLE) was at least partially responsible for the reduction in heroin supply, then this is one of the costs to factor in. Even estimating the costs of drug law enforcement in Australia was problematic because of the complex relationships between state and Australian Government law enforcement agencies and the difficulty in apportioning the costs of each services activities to the reduction in heroin supply. We were also unable, to estimate: (1) the opportunity costs of DLE, that is, costs and benefits of alternative interventions that could have been implemented with the funding that DLE received; and (2) the costs and benefits of other factors that may have played a role in reducing heroin supply. For all these reasons we did not attempt an economic evaluation.

INTRODUCTION

Historically, Sydney, NSW, has been the main importation and distribution point for heroin in Australia (Australian Bureau of Criminal Intelligence 2002). By the 1990s, large open air drug markets were firmly established in three Sydney suburbs: Kings Cross, on the city's eastern fringe, long known for its thriving illicit drug trade and sex work industry; Cabramatta, approximately 30km south west of the city centre, Australia's primary distribution point for heroin; and Redfern, located on the city's western fringe (Gibson, Degenhardt et al. 2003). While heroin distribution dominated the market in Cabramatta, the markets in Kings Cross and Redfern were also involved in methamphetamine and cocaine distribution (Gibson, Degenhardt et al. 2003).

During the 1990s, the Kings Cross and Cabramatta markets became increasingly organised, coordinated by a number of crime syndicates each associated with the distribution of particular drugs (Lintner 2002). While there is little documented evidence on the structure and scale of these illicit drug markets, Lintner has argued that the drug market in Redfern evolved through links developed between persons detained in prisons and juvenile detention (Lintner 2002). He argued that indigenous Australians in custody developed links with detainees of Indochinese descent and eventually led to the informal establishment of the drug market in Redfern after release from detention (Lintner 2002). Gang involvement was evident at all levels of the drug market, from 'runners' for local gangs through to higher level suppliers linked to organised crime groups involved in a range of illegal activities. The gaps left in the heroin market by the removal of key players (either individuals or groups) at the street level by police activity were quickly filled with a steady supply of heroin users and gangs ready to capitalise on the profits from heroin distribution (Maher, Dixon et al. 1998; Caulkins 2002).

These changes were also accompanied by a sharp increase in the scale of the heroin market in the 1990s. This was reflected in large increases in opioid overdose deaths, numbers of persons entering opioid replacement therapy and other treatments for heroin dependence, increased arrests related to heroin possession or use, and an increasing hepatitis C epidemic (Hall, Degenhardt et al. 1999; Hall, Ross et al. 2000; Law, Dore et al. 2003). The increased heroin use was undoubtedly driven by an increasing availability of cheap, pure heroin. In NSW during the late 1990s, the price of heroin decreased, heroin purity at "street" level increased, and heroin was the drug most commonly injected by injecting drug users (IDU) (MacDonald, Robotin et al. 2001; Darke, Topp et al. 2002; Topp, Kaye et al. 2002).

In early 2001, there were key informant reports of a sudden decline in the availability of heroin in Sydney (Day, Topp et al. 2003; Weatherburn, Jones et al. 2003). The Illicit Drug Use Reporting System (IDRS) – Australia's strategic early warning system – revealed a similar pattern across Australia, with an overall reduction in the availability and purity of heroin, and an increase in heroin price, for all major heroin markets (Topp, Kaye et al. 2002; Day 2004; Day, Degenhardt et al. submitted). The reduction in availability – the so-called "heroin shortage" – was greatest from January to April 2001, and in a recent report, the heroin market did not appear to have returned to levels seen prior to the reduction in heroin supply (Day 2004). An exhaustive analysis of the reason for this reduction in heroin supply has suggested that the heroin shortage was probably the result of a number of factors, but it is likely that international and border level law enforcement played some part in it (Degenhardt, Reuter et al. 2004).

A comprehensive body of research has been conducted on the heroin shortage and its effects by researchers at the National Drug and Alcohol Research Centre (NDARC), Turning Point (Victoria) and the Drug and Alcohol Services Council (South Australia). This research examined the course of the heroin shortage, the likely causes of the reduction in supply, and examined in detail the likely effects of this change. It also considered the implications of the findings for health, law enforcement and policy. The reader is encouraged to consult the reports/papers that have emerged from this work (Degenhardt and Day 2004; Degenhardt, Day et al. 2004; Dietze, Miller et al. 2004; Harrison, Christie et al. 2004). For the purposes of this report we briefly summarise the changes that were noted, to provide the reader with some of the context .

Effects of the heroin shortage

One of the clearest consequences of the reduced heroin availability in NSW was a decrease in the use of heroin by injecting drug users (IDU) and a concomitant increase in the use of cocaine and possibly methamphetamine (Day, Topp et al. 2003; Topp, Day et al. 2003; Roxburgh, Degenhardt et al. in press). Such a change in drug use patterns was unusual because heroin has long been the preferred drug among the IDU population in NSW (Breen, Degenhardt et al. 2004).

After the reduction in heroin supply, fatal and non-fatal heroin overdoses decreased by 40%, with a larger decline among younger than older age groups. Despite some evidence of increased cocaine, methamphetamine and benzodiazepine use after the reduction in heroin supply, there were no increases in non-fatal overdoses on these drugs recorded at hospital emergency departments (ED) or in deaths attributed to these drugs. There was a small increase in treatment seeking among older heroin users and improved treatment compliance but neither of these changes was sustained. There was a sustained decline in injecting drug use, as indicated by a substantial drop in the number of needles and syringes distributed by needle and syringe programs (NSPs). There was a short-lived increase in property crime in NSW followed by a sustained reduction in such offences. By contrast, SA and VIC did not show any marked change in property crime.

Were there changes in economic costs?

Did the heroin shortage reduce the costs of heroin use and its associated harms? Simple questions do not always have simple answers. Measuring the economic impact of the reduction in heroin supply on the availability of heroin use, while complex, is only part of the answer.

In order to answer the question fully it is necessary (1) to quantify the economic resources that were used to reduce the availability and use of heroin and (2) to compare these costs with the costs and benefits of alternative methods of attempting to achieve the same outcome. In an age where policy decisions are expected to be “evidence based”, the questions become: “were the resources expended to achieve the heroin shortage the most efficient investment?” and “were there other ways to invest money to achieve a better outcome?” These questions are very difficult to answer for reasons that we will outline below, but first it necessary to introduce some basic concepts in economic evaluation.

As will be discussed throughout the report, it was not possible to conduct an economic evaluation within the scope of this project because we cannot satisfy the necessary conditions for doing one. These conditions require that we can estimate the costs of: (a) the program that produced the shortage (assuming we can agree on this), (b) the costs of the program that existed status quo ante, (c) the costs of the consequences of heroin and other drug use; and (d) the benefits of the decreased availability of heroin. In this report, we examine the issues that need to be considered when attempting such an economic evaluation.

Principles of economic evaluation

Economic evaluation is important because resources are finite and are never sufficient to meet all the demands that could be made upon them. This is true of drug and alcohol treatment, health care, crime prevention as much as a whole economy. Resource scarcity includes human resources, time, knowledge and capital. This scarcity forces us to make choices. To make the best choices we need high-quality information that is gathered and analysed in a systematic, timely, and informed manner.

It is often argued that competitive markets will assure the allocation of resources in an efficient manner. When markets are not competitive, as is often the case in health care (Evans 1984), formal economic evaluations must be used to assist in decision making. An economic evaluation is a systematic assessment of the resource use and outcomes of a given intervention, in comparison with some competing policy or “comparator”. In any economic evaluation there must be at least one comparator. This comparator may be an alternative method of dealing with either the same or a different problem.

For example, one might want to compare costs and outcomes of two methods of providing maintenance therapy for heroin. Alternatively, one might like to compare whether a treatment for heroin abuse is more or less cost-effective at achieving given outcomes than a customs operation to prevent illicit drug importation. An economic evaluation examines both inputs (costs) and the outputs (benefits/harms) of the intervention under consideration. Thus, the conduct of any economic evaluation requires the identification, measurement, valuation and comparison of the costs and benefits of the alternatives under evaluation (Drummond, O'Brien et al. 1997).

Types of economic evaluations

The types of economic evaluations can be primarily classified into two classes: cost-effectiveness analyses and cost-benefit analyses. Other types of evaluation, such as cost-utility and cost-minimisation, can be regarded as special cases of cost-effectiveness analysis.

Cost-effectiveness analysis (CEA)

This type of economic evaluation compares at least two programs (interventions) in terms of the resources that are used in providing each program (costs) and the outcomes (benefits) of the program (measured using natural units such as life-years saved or cases of disease prevented). In *cost-minimisation* the costs are assessed in the same way as in cost-effectiveness analysis but because the outcomes of the programs are statistically equivalent the comparison is simply between their costs. *Cost-utility* analysis measures costs in a similar fashion, but the outcome is measured in terms of quality of life

measures such as QALY, EuroQoL or HYE (Drummond, O'Brien et al. 1997). These measures, which combine quality of life and life-years-saved, are useful for illnesses that have little impact on mortality but large adverse effects on quality of life. Cost-effectiveness methods are often rejected in preference for cost-benefit analysis (discussed below), which is a broader analysis that often measures broader societal impacts. Nonetheless CEA is useful method for comparing an existing program with a new program/s.

Cost-benefit analysis (CBA)

CBA quantifies costs in the same way as CEA, but it differs from CEA in that it attaches monetary values to outcome measures. It is a useful method when a single outcome measure cannot be selected (i.e. a number of different outcomes achieved by a program are all important), or if the natural outcomes of the two interventions are different (i.e. recidivism and cases prevented). The use of a monetary outcome provides a common denominator. The use of a CBA requires that the outcomes, such as cases prevented, decrease in heroin use, or lives saved, can all be valued in monetary terms. This raises a number of challenges, one consequence of which is that many CBAs only include those costs and benefits that are easy to assess, thereby missing important but unquantifiable outcomes.

A key challenge in CBA is how to value a human life. This is one of the one of the more controversial and challenging issues raised by this method. One of two methods, the human capital or the willingness-to-pay approach, are usually used. The willingness-to-pay (WTP) approach involves quantifying the amount individuals (or families) would be willing to pay for a treatment or to avoid a given outcome. Some issues around the use of WTP include: an individual's willingness to pay is often affected by their ability to pay; difficulties in posing questions that will elicit credible estimates of willingness to pay; the fact that individuals do not usually pay the full costs for treatment or other government services (i.e. law enforcement, Customs), and so are not aware of the actual costs.

The human capital approach quantifies the productivity loss to society as a result of early deaths. The first step is to estimate the number of years lost (average life span minus age of death) and then multiply this by an average wage. Difficulties arise in this method when one attempts to value the life of a child who has yet to enter the workforce, a retired person, or a currently unemployed person with few employment skills. The simplest approach is to use the average wage which may overestimate the value of a given program. However, not valuing lives in this way will also arguably underestimate the benefits of a program.

A cost-benefit study often compares the costs of an intervention with those of the “do-nothing alternative”. This referred to as a cost-offset study. When this method is used the costs of treating the illness in so-called “do-nothing” alternative are often overlooked. The results of a cost-benefit study can be presented as cost-to-benefit ratio, or a comparison of net-costs between two programs.

Non-economic evaluations

There are a number of other evaluations that also provide useful information to policy makers such as cost-analyses, cost of illness studies, outcome descriptions, and effectiveness evaluations. These are limited from an economic perspective because they

do not evaluate both costs and outcomes. They accordingly do not provide information about the opportunity cost of resources nor do they answer the basic question about the most efficient use of resources.

Cost-analysis

A cost analysis is simply the estimation of costs of one or more programs, without any indication of what outcomes are achieved, or what benefits are forgone by the use of those resources. For example, a program may be cheap to operate but achieve no positive or even negative outcomes, whereas another program may be very expensive to run but achieve very good outcomes. This difference would not be evident from a cost-analysis.

Cost-of-illness studies (COI)

COI studies are a form of cost-analyses that have been commonly used in the drug and alcohol field. COI measures a wide assortment of costs that are attributable to a particular illness in order to estimate the total burden of disease in dollar terms. Included are costs to business, economic costs, indirect and direct costs (Rice 1994). These can include costs related to: treatment; other health services use; lost productivity due to mortality and morbidity; criminal activity; policing; courts; and social services.

COI studies are defended as an aid to decision making for policy makers by agencies such as the World Health Organisation and the World Bank (Byford, Torgerson et al. 2000). Such studies can be used to illustrate the economic impact that a given illness has on society at large or on specific sections of the system (eg. health, courts, social systems). They can also be used to assess whether the social costs related to alcohol are more or less than the social costs related to the use of illicit drugs or tobacco. They often play an important advocacy role in making a case for a disorder being given higher social priority than it is currently receiving.

COI studies often use a similar method of estimating costs as a CBA but there is a key difference which is often overlooked: that the COI estimates the total cost of an illness compared with an implicit counterfactual situation, that is, how the world would look like if heroin (or alcohol or tobacco) were not used. A CBA, by contrast, estimates the costs and benefits of a given program that reduces the use, availability and harms caused by heroin use.

There are other criticisms of COI studies. The burden of disease can be estimated using this approach to improve our understanding of the significance of the problem, and possibly assisting in directing research or treatment funding. However, often it provides optimistic assessments of the societal gains if this disease was eradicated (Byford, Torgerson et al. 2000) because the costs to society are overestimated and very few diseases can be eradicated.

There is another limitation in using COI as the sole tool in assessing costs. When comparing the costs of an illness of interest with the counterfactual of zero disorder, such a study does not provide any information about efficiency gains the optimum distribution of resources between different programs to deal with the same illness, or compare resource allocations across different illnesses.

Framework for an economic evaluation

The following section discusses the general principles and methods of undertaking an economic evaluation and discusses these issues as they apply to the heroin shortage.

Stating the question

The first step is to clearly articulate a question that reflects both changes in the costs and outcomes from the introduction of a new program or treatment. The programs to be compared and the type of economic evaluation to be undertaken must be identified.

Perspective of the evaluation

The next step is to determine the perspective of the economic evaluation, that is, from whose perspective is the costs and benefits being quantified? A common perspective is societal (the most difficult but often the most credible). Other perspectives are those of the government(s), a government department, a specific program, or personal costs.

Table 1 presents costs according to how they are incurred (direct, indirect or intangible) and by who (drug users, non-users, or government). In a full evaluation of social costs, all of these costs would be included. However, since it is not often feasible, many economic evaluations including social costs do not attempt to measure intangible costs. Cost effectiveness analyses often take a narrower perspective, for example, that of a government department or provider, whereas cost benefit studies usually takes a broader social perspective. When undertaking any economic evaluation, it is important to state the perspective, clearly articulate the reasons for the choice, and then ensure that the costs and outcomes included match the chosen perspective.

Table 1: Types of costs used in economic evaluations

Types of costs	Drug users	+ Non Users	+ Australian Government and State Governments	+ Social security	= Society
Direct costs	(1) purchase of drugs	(2)	(3) public cost of prevention and maintenance programs, cost of medical treatment	(4)	
Costs of direct consequences	(5) personal costs of individual treatment, court/legal fees	(6) personal costs of treatment for transmitted diseases, personal injury	(7) Treatment costs, legal/court/jail costs,	(8) reimbursed cost of individual treatment and cost of treatment for drug users victims	Total cost to society
Cost of indirect consequences	(9) lost earnings	(10) lost productivity, lost earnings	(11) Lost tax, social assistance	(12) lost social insurance contributions	
Cost of intangible consequences	(13) drug-related loss of well-being due to disease, death, or incarceration	(14) family loss of well-being due to drugs, deaths etc.			

Adapted from Figure 2 (Single, Collins et al. 2001)

Identify, measure and value resource use

The next steps are to identify the type of resources used in each alternative program, to measure them, and apply a cost to the resources used. Identification of resource use means determining which types of resources (staff time, consumables, equipment and capital) are used in both the program that is being evaluated and its alternative.

Once the types of resources used are identified they need to be quantified. If the use of a particular resource is difficult to quantify and this resource has only a small contribution to overall resource use, a decision may be made to exclude the resource from the analysis. However care needs to be taken in such determinations, as important information may be lost.

The next step is to apply a cost to the resources used, or valuation. In an area where a resource has no market value, decisions have to be made as to the most appropriate valuation to be placed on the item. Valuing the time of a volunteer or unemployed person is one example of such an approach.

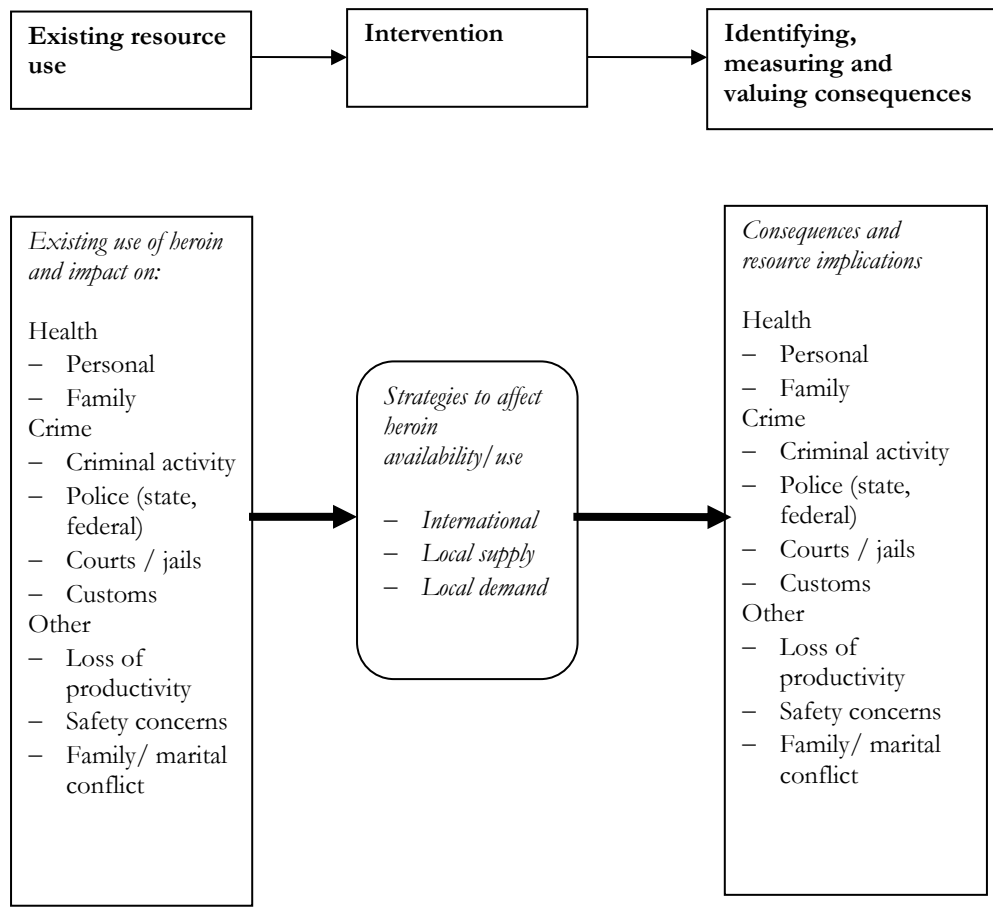
Identify and measure outcomes

Economic evaluations require an outcome measure representing either a final or intermediate outcome from the resources used. Examples of outcome measures include lives (or life years) saved, cases prevented, drug seizures¹, or some other measure of decreased heroin availability. Regardless of which outcome measure is used, it must be attributable to the cost side of the equation.

Economic evaluations are increasingly being conducted in all areas of health care including the field of drug and alcohol treatment. Evaluations of pharmacotherapies for the treatment of problematic drug use (Mattick, Digiusto et al. 2001; Doran, Shanahan et al. 2003; Doran, Shanahan et al. In press) are relatively straightforward, because the interventions are clearly defined, the groups known and the outcome of interest are measurable. Yet even in the context of treatment evaluation, the choice of which costs and benefits to measure are often challenging and difficult to both conceptualise *and* measure (French 1995). In the wider context of evaluating the social costs of drug use problems, a range of “tangible” and “intangible” costs have been identified, which apply both to the user (“private” costs) and the wider social context (“external” costs).

¹ To use drug seizures as an outcome measure, one must relate the size or number of drug seizures to some measure of the total drug supply.

Figure 1: Framework to consider if evaluating the costs (and cost savings) of a reduction in heroin supply



EVALUATING THE HEROIN SHORTAGE FROM AN ECONOMIC PERSPECTIVE

For the rest of this report, we will outline a possible approach to measuring the costs and outcomes of achieving a decrease in heroin supply. We will follow the framework outlined above, and discuss some of the issues in undertaking such an evaluation and the likely limitations of the results of any such evaluation.

Identify the program, the alternative and state the question

The two key challenges in evaluating the economic impact of the heroin shortage are: (a) identifying what strategy/program resulted in the heroin shortage; and (b) deciding what for comparative purposes was the alternative policy. In other words, what resources were expended in producing the shortage? In addition, what would have been the result if the heroin shortage had not occurred, and was there another way of achieving the same outcome with different amounts of resources?

Identifying the program resulting in the heroin shortage may be the limiting factor in evaluating its economic impact. The increased budget for drug law enforcement to target the importation of heroin may have played a significant role in reducing heroin supply. However, there were other events and circumstances that may also have had a significant impact on heroin supply. It is uncertain whether these factors can be identified, let alone quantified. If these other factors were significant in reducing heroin supply, any evaluation would omit the costs of these factors. We will return to this issue later, but for now we assume that such a program can be fully identified.

We now need to state the question to be addressed. The earlier question of whether or not the heroin shortage resulted in reduced costs associated with heroin use and its associated harms, although interesting, is not a question that can be addressed by an economic evaluation. One possible question that might be posed is:

“From the perspective of both the Australian Government and the State/Territory Governments, were the resources expended in achieving the decrease in the availability of heroin availability the most cost-effective/cost-beneficial way of saving lives compared to the previous program?”

This question raises a number of questions in turn. Which costs should be included: only those of the Australian Federal Police (AFP) and Australian Customs Service (ACS), or state police as well? What about health related costs? What about costs incurred internationally? While international costs would not be included in answering the question as posed here; if international events produced the heroin shortage, excluding them would lead to findings which would be meaningless in any attempts to replicate the program. When a question is posed, one needs to ensure that it can be answered and the outcomes and costs are measurable.

Figure 1 provides a possible framework for evaluating interventions that might have an impact on the availability or use of heroin. In this framework the comparator or alternative to the program is likely to be the “status quo” as it existed before the new intervention., that is the health, crime and other social costs before the intervention.

Selecting the appropriate method of economic evaluation is the next task. Will it be a cost effectiveness analysis or a cost benefit analysis? A cost effectiveness analysis (CEA) would be appropriate if there was a single defined outcome that was representative of the objectives of the program. Examples of such an outcome might be lives (or life years saved), a change in the number of heroin users, changes in harms related to heroin use, and so on. While it might be tempting to use number/quantity of heroin seizures, this outcome would only be valid if we knew what proportion of heroin imported into the country was seized.

A cost benefit study would permit the quantification and valuation of a wider selection of outcomes. It would also require that all outcomes are valued in monetary terms, thereby presenting the challenges of valuing human life.

Choosing the perspective

The perspective taken will determine which costs and outcomes are included. In any economic evaluation of the heroin shortage, there is a strong argument for adopting a societal perspective in which expenditures by all levels of governments and personal costs would be estimated (Table 1, Boxes 1-12). These would include the cost of the provision of the program and its alternative, the costs/savings related to these programs, as well as any losses/gains of productivity for both the program under evaluation and its alternative. If this perspective were selected, then a cost benefit study might be the most appropriate method of evaluation.

An alternative perspective is that of the Australian Government and State Governments. In this, expenditures and outcomes related to law enforcement, courts, customs, health and social services are included (see Table 1). Another option is a narrower departmental perspective in which only costs and benefits directly related to a government department, such as the AFP or ACS, are included. These departments may be interested in the cost effectiveness of their expenditures in decreasing the supply of heroin on the street. In this case, it would be important for the costs and the benefits to reflect the same perspective. This may result in the evaluation missing key costs and outcomes. For example if only the perspective of the AFP was taken, the input costs of ACS would be excluded, and the cost of achieving the reduction in the availability of heroin would not be completely identified. Similarly, if the decreased heroin availability was considered to occur as a result of police and ACS activity, but treatment costs or drug use patterns changed, these would not be taken into account in the evaluation. In selecting a narrow perspective, it is important that other important costs and outcomes are recognized, and the limitations of the study are made explicit.

Consideration must be given to the possible international causes of the heroin shortage. If the direct causes of the Australian heroin shortage included events that occurred beyond Australia's borders, then even a societal perspective would provide too narrow a perspective.

Identifying and valuing the resources used to reduce heroin supply

We need to capture both the cost or resources used to provide the program and the outcomes achieved by the program. It is easier to undertake this identification process when comparing two distinct programs. For example, Program A may lead to increased

treatment costs for heroin users, decreased costs from criminal activity, and increased use of educational services. Program B may lead to fewer heroin overdoses but increased admissions for drug-induced psychoses. To evaluate these, one simply measures and values the resources for each program and then compares them and their outcomes. If the alternative policy is the status quo in the absence of a heroin shortage, it may be difficult to identify and estimate the resources used to achieve the status quo comparator. In either instance it is important to identify the extent of the resource use (both increases and decreases for each program) and its value for the cost side of the equation.

In addressing the costs, an important issue is the extent to which we think that law enforcement efforts contributed to the reduction in heroin availability. If we think that Australian law enforcement contributed to the reduction in heroin availability, then we need to consider the following factors:

- Which resources of the AFP, ACS, and state police were directed towards reducing heroin availability? How were these resources different from the alternative (assuming that the alternative was the status quo ante)? It is important that the evaluation does not simply use budget information, but identifies resources that were actually used. Likewise, only the expenditures related to achieving the outcome should be identified.
- Is it possible to identify which level of law enforcement was responsible for the reduction in heroin availability? Can we reasonably distinguish the effects of local level policing from international level, or intelligence obtained at all levels?
- What is the resource expenditure in the alternative program?

Identifying the consequences of problematic illicit drug use

If, as outlined in Figure 1, the comparator was the status quo ante, it is necessary to identify the consequences of problematic illicit drug use before and after the intervention. Table 2 expands on this by providing more specific information on consequences of problematic heroin use and other drugs. The list below is not complete, but builds upon the work of French and colleagues (French 1995).

Table 2: Potential consequences of problematic drug use

Physical health problems	Mental health problems	Criminal Activity	Social Problems
<ul style="list-style-type: none"> • Burden of disease (morbidity) • Years of life lost (mortality) • Treatment for heroin use (detoxification, maintenance, residential rehabilitation) • Treatment for other drug use • Problematic drug use • Drug overdose • HIV related problems • Hepatitis • Neonatal disorders • Injuries • Assault • Homicide • Suicide • Accidents 	<ul style="list-style-type: none"> • Drug induced psychosis • Exacerbation of other mental health problems: depression, anxiety, schizophrenia, post traumatic stress disorder • Poor self esteem 	<ul style="list-style-type: none"> • Drug sales • Violent crime • Property crime: robbery, motor vehicle theft, burglary • Fraud: credit card fraud, prescription forgery 	<ul style="list-style-type: none"> • Property loss and damage • Reduced job performance: productivity loss, absenteeism, accidents • School problems • Homelessness • Poorer family functioning: parent-child conflict, marital conflict, divorce, violence, child abuse • Unemployment • Community problems: property declines, safety concerns, community disruption • Law enforcement resources to police drug problems • Local level policing of drug markets • Investigation of other drug related criminal activity AFP National Crime Authority ACS • Resources to prevent drug problems

Issues to consider

As discussed above, there are a number of limitations pertaining to specific indicators of drug use and related harms. However, there are additional issues that need to be addressed when attempting to determine the economic impact of the heroin shortage.

These include:

- What was the ‘program’ that led to the shortage?
- How long was the shortage?
- Have we considered all consequences of drug use?
- What consequences can we measure? (e.g. emergency department admissions for heroin vs. psychosis, cocaine or benzodiazepines)
- At what level do we measure these consequences? (e.g. local area or state)
- Did the price of drugs change?

Measuring costs and consequences

We could make some estimates of the length of the heroin shortage, such as 12 months. We have also obtained some measures of the harms caused by the use of heroin and other drugs, such as drug overdose, drug-induced psychosis, treatment and blood borne virus transmission. However, we were not able to quantify *all* consequences of drug use. There is also a bias in the available data in Australia in that it provides better information about heroin related harms than it does about psychostimulant harms. This is probably related to the greater harms risk of overdose from heroin, the less obvious harms associated with psychostimulant use (e.g. depression and psychotic symptoms), and the recent increases in psychostimulant use. The increased costs of heroin and the increased expenditure on drugs such as cocaine during the shortage also need to be taken into account.

Finally, and most importantly, it is not possible to decide how to estimate the factors causing the reduction in heroin supply. Even estimating the costs of drug law enforcement in Australia would be difficult, given the interrelationship between state and Australian Government law enforcement agencies and the difficulty in apportioning the costs of each to the outcome of reducing heroin supply.

CONCLUSION

Although it is of major policy interest to estimate economic benefits (or costs) of achieving the reduction in heroin supply, our analysis shows that it is not conceptually or empirically possible to satisfy the necessary conditions for doing a valid economic evaluation. The major obstacles include the impossibility of estimating the costs of (a) the program/intervention that produced the shortage (assuming we can determine what caused the shortage) and (b) the program that existed status quo ante.

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