



No. 257

Researching Heroin Supply

Shona Morrison

Illicit drug markets are, by definition, unregulated, unaccountable and unpredictable. Operators in this market do not enjoy access to the sort of economic data upon which traders in legal commodities depend; they cannot insure their products against loss; transaction costs are high; and, most significantly, those involved in the trade are susceptible to changes in activity by law enforcement or their competitors.

This paper focuses on the role of research in assessing what impact changes in the supply of heroin from source countries might have. Such changes are difficult to explain and even harder to predict due to the lack of reliable data on drug production, price indices and a range of other variables. This paper reviews lines of heroin supply, up to the borders of drug consuming nations. It is argued that the descriptive method most regularly used to present supply indicators needs to be supplemented with a conceptual approach. Theories or models of drug supply are required in order to advance research, improve empirical collections and broaden knowledge about drug markets in general.

Adam Graycar
Director

Why Monitor the Supply of Illicit Drugs?

Regular monitoring by researchers of drug supply indicators (such as cultivation levels, yields, prices, seizures and purity) is important for a number of reasons, not least of all for the purpose of assessing the reliability of existing data. This involves systematically reviewing the methodologies used for collecting such information, and examining how those data are evaluated. In the past, data used to monitor supply have been criticised for being unreliable (Childress 1994; Reuter 1996; Farrell 1999). For example, estimates of areas under opium poppy cultivation have sometimes varied between agencies using different methods of data collection and different formulas for calculating potential levels of cultivation. However, it may be argued that although none of these estimates can provide accurate calculations of absolute cultivation at any particular point in time, they are useful for monitoring *trends* in drug supply. Indeed, methodological deviations between different agencies may be a beneficial way of validating those trends. The confidence with which overall patterns of drug supply are regarded should increase when separate agencies report similar changes or trends (which they regularly do) (see Figure 1).

Systematic data collections can also help to inform drugs policy. However, the capacity of drug supply indicators to inform *both* supply-side and demand-side policy is regularly overlooked. The collection and analysis of information on supply and demand is conducted, with very few exceptions, by separate agencies (the former by intelligence agencies and the latter by health/academic institutions). In consequence, "source-to-border" (or supply-side) indicators are analysed:

- (i) mostly for the purpose of addressing questions on the effectiveness of law enforcement or other supply-side policies; and
- (ii) very rarely to look for clues about potential changes in domestic markets for drugs (within the border) and the subsequent impact on demand (although a *hindsight* scrutiny of supply data can be prompted by unexpected drug market events such as the recent heroin "drought" in Australia—see, for example, Dietze & Fitzgerald 2002).

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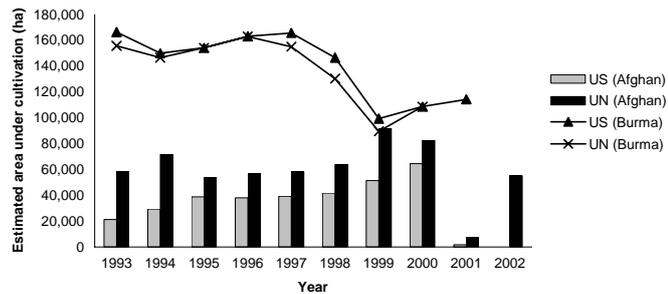
A solution to this might be the creation of a central repository, or warehouse, for all types of drug data. Although some data may need to be produced in aggregated form only (in order to ensure that police or health strategies are not compromised), regular review and publication of the data would increase dialogue across agencies and help bridge the existing functional separation of drug markets into “supply-side” issues and “demand-side” issues.

One of the consequences of, or possibly a reason for, the lack of research interest in “beyond-the-border” drug supply indicators is the shortage of theories or models of drug supply to drive the process. Although some have adopted analytical frameworks to examine drug supply issues (for example, Williams & Florez 1994; Williams 1995; Morrison 1997), few theories have been proposed to explain fluctuations in supply. An active research agenda on illicit drug supply, which is based on rational hypotheses and is linked to policy formation, is long overdue in most Western countries where the bulk of refined illicit drugs is consumed.

An Overview of Heroin Supply Trends

From the sowing of opium poppy seeds in Burma or Afghanistan to the purchase of heroin by end users in destination countries, a variety of stages involving cultivation, production, transit and distribution must be successfully completed. The geographical pattern of sources for opium and heroin, trans-shipment routes and ports of arrival are remarkably well documented, but the dynamics of drug movements are not so easily understood (Office of National Drug Control Policy 2001). For instance, we know that the Australian market for heroin is supplied from different sources than the European market and the United States market. However, we know less about the economic and risk management choices of opium growers and traffickers that have influenced those patterns. This section summarises what we do know about supply routes for heroin into different markets, and discusses some of the factors driving those trends.

Figure 1: Opium poppy cultivation estimates by US Department of State and UNDCP, 1993–2002



Source: US Department of State 2002; UNDCP 2002a, 2002b.

US and European Heroin Supplies

Just over a decade ago, the bulk of heroin consumed in the US came from the “Golden Triangle” region in South-East Asia (Burma, Laos, Thailand). In the early 1990s, reports began to emerge of a new and significant source of heroin in South America (DEA 1996). The Drug Enforcement Administration’s Heroin Signature Program reported that 65 per cent of US heroin seizures came from South America in 1998 compared to 32 per cent in 1993. While it is possible that different counting methods or changes in law enforcement efforts might explain this change, it could be argued that a competitive advantage had been achieved by Colombian traffickers’ successful domination of the cocaine market, reducing the usual entry barriers to the relatively new heroin market in the US. In addition, although cocaine remains the largest illicit drug export of the South Americas, there have been reports that the US market for cocaine has been slowing down; this could have provided the motivation for diversification.

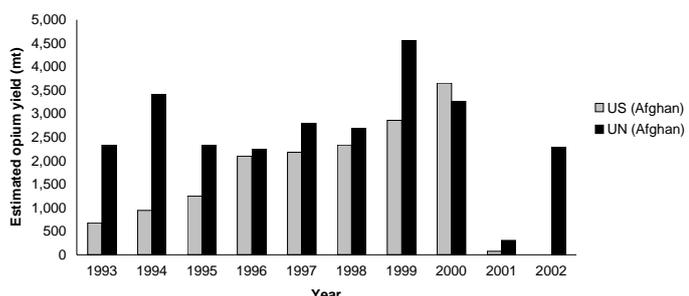
European heroin trails point to Afghanistan (which together with Iran and Pakistan is known as the “Golden Crescent”) as the major source of heroin (see Figure 2). The Balkans were the most common transit route for heroin

through most of the 1980s and early 1990s (Farrell, Mansur & Tullis 1996; MacDonald & Mansfield 2001). Although the Balkans route continues to be important (Heijden 2001), the war in the former Yugoslavia instigated a diversion in supply lines out of Afghanistan to the republics of Central Asia.

Given the importance of South-West Asia as a poppy-growing region, it is revealing to examine the economic context of opium farming in Afghanistan. Even in areas of Afghanistan with high levels of poppy cultivation, farmers do not grow this crop exclusively, but as part of a wider cropping pattern (MacDonald & Mansfield 2001). There are several reasons for this, not least the high labour intensity of opium harvesting. It has been estimated that only around one per cent of total arable land in Afghanistan was under opium cultivation in 1999—a year noted for a “bumper harvest” (ODCCP 2001). Cultivation levels, then, could expand significantly if farmers achieved better technology, better organisation or, indeed, higher rewards.

A reduction in cultivation levels is, of course, also possible for economic or political reasons. During the 2000–01 growing season, the Afghan government of the time, the Taliban, issued a

Figure 2: Opium yield estimates for Afghanistan by US Department of State and UNDCP, 1993–2002



Source: US Department of State 2002; UNDCP 2002a, 2002b.

decree banning cultivation of opium poppies. Although there were conflicting reports of the sincerity of the Taliban's ban (see Rashid 2000; Wolffe 2002), subsequent estimates have suggested that a considerable decline in opium cultivation—possibly as high as 94 per cent—occurred in 2001 (ODCCP 2002). The Interim Administration in Afghanistan also banned opium poppy cultivation in January 2002, but there is little evidence of compliance by farmers or of sufficient capacity in the new Administration to enforce the ban (see Cockburn 2002; US Department of State 2002). Indeed, latest reports suggest that opium poppy cultivation returned to relatively high levels in 2002 (UNDCP 2002a; ODCCP 2002).

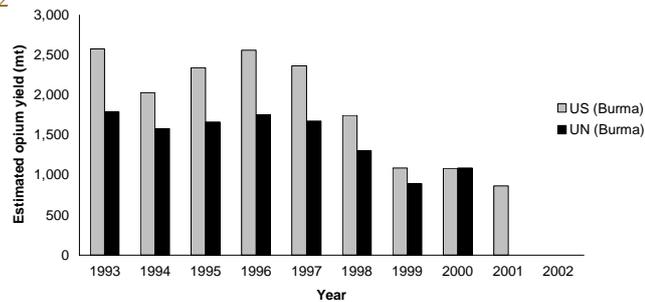
Australia's Heroin Supply

The bulk of heroin entering Australia originated from opium poppies cultivated in the Golden Triangle (UNDCP 2002b). Myanmar (formerly Burma) is the largest source country for opium in this region (Figure 3).

The Golden Triangle, like other drug-producing regions, is characterised by insurgency and economic insecurity. However, the military government in Burma, the State Law and Order Restoration Council (SLORC), forged ceasefire agreements with several separatist factions which allowed those groups to trade in heroin with impunity. The period of those agreements is now coming to an end and SLORC is under international pressure to remove "trading rights" for heroin from future deals with the groups. It remains to be seen whether SLORC will indulge the international community or, indeed, how the insurgent groups (and the traffickers) will respond to a directive of this nature.

Fluctuations in farm-gate prices for opium throughout the growing season in Afghanistan tell an interesting story about traders' control over the poorest farmers and the strategies of larger landowners to maximise returns (see MacDonald & Mansfield 2001). Such detailed economic analysis is not available for Burma, but annual changes in farm-gate prices (as reported by the UNDCP) suggest a likely, and

Figure 3: Opium yield estimates for Burma by US Department of State and UNDCP, 1993–2002



Source: US Department of State 2002; UNDCP 2002b.

economically rational, relationship with subsequent levels of opium cultivation. Figure 4 plots trends in farm-gate prices and cultivation estimates for Burma. These data show clear fluctuations in price, with cultivation estimates lagging behind by about one year. This may represent the economic rationality of opium farmers who have to make choices about cropping patterns in order to maximise returns (that is, when prices drop, farmers plant less opium the subsequent year but when prices rise, they plant more).

Until the mid-1990s, the most common trafficking route out of the Golden Triangle was overland through Thailand. However, for reasons that are uncertain, although possibly due to a law enforcement clampdown on Thailand's border with Burma and the loss of stake in the US heroin market, the principle transit route was displaced in the mid-1990s to China's southern provinces (ODCCP 2001). Commensurate with this change in route is an increasing population of opium and heroin users in China itself (and official PRC estimates are widely regarded to underestimate the true problem) and rising seizures by Chinese law enforcement (see Figure 5). The size of the drug-using population in many Asian countries, especially China, raises questions about the extent of

opium and heroin "leakage" along supply lines to Australia and the consequences of increasing pressure on the Golden Triangle to supply all heroin markets in the Eastern hemisphere.

Indicators of Heroin Supply to Australia

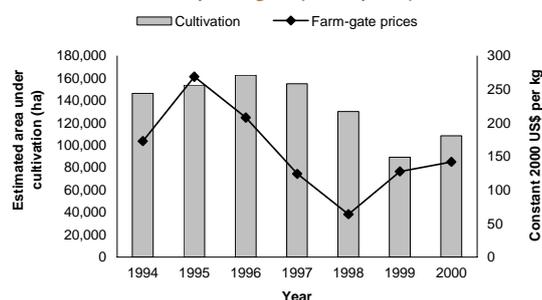
Drug supply research in Australia, and the influence of "beyond-the-border" trends on domestic markets, is rarely undertaken in academic institutions. Correspondingly, little is known about the impacts of growing conditions, trafficking routes or global market competition on domestic wholesale price or purity of heroin. In this section, it is argued that, despite the limitations of drug supply indicators, there are opportunities in research for making better use of supply-side data and, in the longer term, for improving the quality of information on drug supply.

The Potential and Limitations of Existing Indicators

Table 1 provides a list of quantitative indicators that are monitored to detect changes in different stages of the supply of heroin to Australia.

When we compare the long-term trends in the indicators to the more recent changes shown in Table 1, the market patterns are

Figure 4: Cultivation estimates and farm-gate prices for opium in Burma, 1994–2000



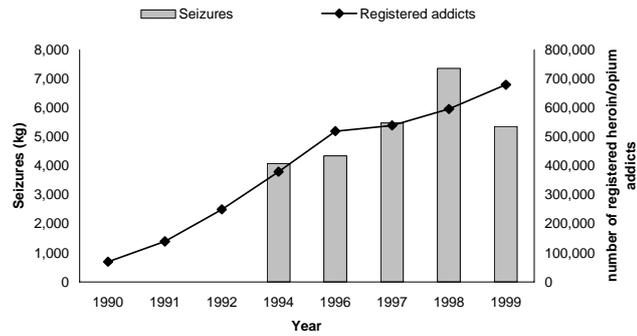
Source: UNDCP 2002b

rather different. Clearly, to make assessments based on only a small number of (the latest) data points can result in misleading conclusions about the state of the heroin market due to a statistical outlier, or even a normal fluctuation. Trend series comparisons are required to assess whether the most up-to-date data demonstrate a persistent change. Agencies using these types of data need to focus less on the latest change and more on trends, and to use statistical smoothing techniques (such as calculating averages across two or three reporting periods) to reduce “statistical noise”.

Research opportunities exist to create a system of “evidence-based” drug monitoring and policy. For instance, trends in seizures do seem to correlate positively with other indicators linked to trafficking (such as opium production), which suggests that these data could be used more effectively to track lines of drug supply (Farrell, Mansur & Tullis 1996; ODCCP 2001). Changes in domestic markets (such as prevalence of use) seem to correlate with seizures also and, using time-series analysis, it is possible to examine these relationships across time and space (see Weatherburn & Lind 1997). Of course, the value of seizures data is vastly improved if combined with price and purity information, and can diminish dramatically if counting methods vary in different jurisdictions or across time (Graycar, McGregor & Makkai 2001). The UN’s Drug Control Program attempts to compile some of these data, but they acknowledge there are substantial methodological problems (UNDCP 2002b). Even within Australia there are problems with data collections on price and purity series (see ABCI 2002) which, at the present time, greatly diminishes the utility of these data for both law enforcers and researchers.

Clearly, drug supply indicators in their current form are limited in their capacity to assist policy-makers to anticipate or evaluate domestic drug market trends. In part, this is due to the lack of information about the *whole* of the supply side of the market (that is, how much heroin is not seized, how many traffickers are not arrested, and so on). Yet by comparing estimates of consumption and prevalence in destination countries

Figure 5: Heroin seizures and registered addicts in China, 1990–1999



Source: UNDCP 2002b

with estimates on production, it might be possible to arrive at crude estimates of the size of the total heroin market (if data are compatible) or, alternatively, identify the extent of the mismatch between the indicators (if the data are incompatible). Attempts to look at North American drug markets in this way have raised serious doubts about the accuracy of the supply indicators, the demand indicators, or both (see Reuter 1996; Reuter & Greenfield 2001). Studies to address those data deficiencies have recently begun (Manski, Pepper & Petrie 2001).

In Australia, the research vacuum on heroin supply has been created, in part, by a partition of data on drug indicators between law enforcement and health agencies. Each rarely has uninhibited access to the work of the other, preventing information sharing and cross-agency research. For most law enforcement agencies, the principal purpose for the collection of seizures data is to study their own performance and effectiveness. In research circles, there has been very little academic interest in “beyond-the-border” drug supply issues. A

“whole of the market” approach to heroin would help to bring together the expertise available in these different organisations.

If a whole of market approach to the study of heroin was adopted, which supply indicators should be included? Qualitative indicators, such as economic or political trends in drug-producing countries, are harder to measure in terms of impact on the flow of heroin, but they lend a depth of understanding that is absent from descriptive, quantitative reports on drug supply. These data are collected by intelligence agencies but are rarely disseminated or discussed by researchers in the field. There are also other quantitative indicators missing from existing data series that would enhance our knowledge of the dynamics of drug markets. Factors which are not studied systematically (if at all), or are simply not widely available, include:

- purity of drugs seized in the source country, transit countries and at the Australian border;
- “value added” or real price increases through the supply chain;

Table 1: Indicators, and their long- and short-term patterns, of the heroin trade from Burma to Australia

Stage	Indicator*	Long-term trend**	Recent change***
Cultivation and production	a) cultivation levels	a) gradual decline	a) slight rise
	b) yield	b) gradual decline	b) little change
	c) farm-gate prices	c) fluctuating	c) increasing
	d) eradication levels	d) fluctuating	d) large decrease
Transit to Australia	e) seizures in transit (weight)#	e) increasing	e) decreasing
	f) seizures at Australian border (weight)	f) increasing	f) decreasing
	g) average purity at the border	g) gradual decline	g) no change
	h) apprehensions for heroin import	h) n/a	h) slight decrease

* The data on which each trend was based were provided by: a) to e) UNDCP 2002b; f) Australian Customs Service DRUGLAN database; g) and h) Australian Federal Police PROMIS database (long-term data not available for apprehensions).

** Long-term trends refer to data patterns over five to 10 years.

*** Recent changes refer to most recent year for which data were available.

Refers to seizures of heroin and opium in China.

- “heroin miles” or lengths of the different supply lines to Australia;
- the potential for “leakage” in transit (that is, diversion of drugs into local transit markets);
- the relative importance of Australia as a destination market compared to other markets (that is, the proportion of Golden Triangle heroin that ends up in Australia);
- transaction costs involved in trafficking heroin to Australia compared to other markets;
- political, social and economic trends in source areas;
- the cropping strategies of farmers in the Golden Triangle; and
- the potential for new sources or transit points for Australia to emerge.

Benefits of collecting this information, or at least studying the feasibility of collecting it, include increasing knowledge about, and the capacity to predict, domestic fluctuations in supply. In the final section of this paper, an illustrative theory of heroin supply is presented with a view to providing a framework for subsequent data collection and research.

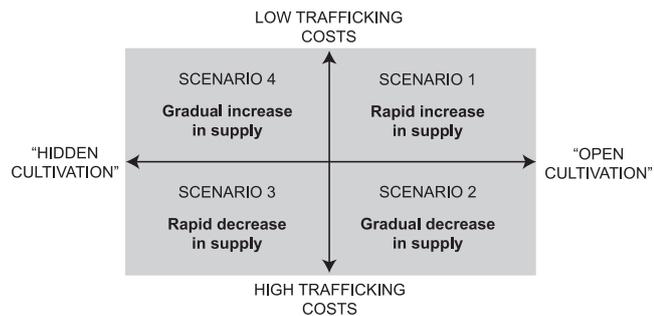
Towards a “Supply Theory” of Heroin

The advantages of modelling complex phenomena include an increase in the capacity of policy-makers to quickly understand large quantities of information and complex relationships between data. They also provide a valuable tool for further hypothesis and data collection. The following model provides a range of extreme or “ideal” examples to explain heroin supplies at, and flowing from, an opium source. It is hypothesised that supply conditions (oversupply, under-supply and so forth) are influenced by the interaction of two dimensions:

- the nature of opium cultivation in source countries; and
- perceived trafficking costs.

The first dimension, which is manifest in overall “openness” of opium cultivation, is a reflection of the social and political situations in source countries. Drug source countries with acquiescent governments or poorly financed de facto rulers (such as insurgent groups) are likely to turn a blind

Figure 6: Model of the dynamics of heroin supply



eye to poppy cultivation, or may even benefit from trafficking, economically or politically. In these areas, poppy cultivation is likely to be at relatively high levels, particularly if the relative prices of other cash crops are low. Furthermore, these sources will be characterised by a degree of “openness” not present in regions with rulers who engage in active enforcement of drug control measures (such as crop eradication and prosecution of farmers).

The second dimension refers not just to financial costs of transporting drugs, but also to the transaction costs to traffickers (which include the problems associated with the logistics of transit and the threats from law enforcement). Other researchers have shown that the landed import prices of illicit drugs are driven largely by the transaction costs incurred by traffickers (see Farrell, Mansur & Tullis 1996).

The model illustrated in Figure 6 suggests that the flow of heroin from a drug source region will depend on the interaction between current sociopolitical conditions in source countries and transportation dynamics. Since these conditions may vary across time and space (for example, across different transit routes), drug supplies also fluctuate. In summary, the model suggests that:

- When cultivation is “open”, an abundant supply of heroin will be available for trafficking when subsequent trafficking costs are low (scenario 1) although supplies may drop when trafficking costs increase (scenario 2).
- Low trafficking costs will attract many potential traffickers, and competition created for supplies will push up purchase prices and help to maintain high levels

of cultivation. Many farmers will view opium poppies as a “risk-free” and significant cash crop. The source will, in total, produce large quantities of relatively low-priced opium.

- If trafficking costs increase, fewer traffickers will compete for opium supplies and farm-gate prices will drop. Farmers will respond to drops in farm-gate prices by reducing subsequent cultivation levels.
- When cultivation is “hidden”, high trafficking costs will result in shortages of heroin (scenario 3), although lower trafficking costs may increase availability to some extent (scenario 4).
- When farmers face higher risks, collective levels of cultivation will be lower and higher farm-gate prices will be required to encourage the planting of opium crops. If net trafficking costs are also high, there will be fewer traffickers vying for supplies and drug flows will be below “optimal” levels (and on-sell prices will be high).
- If cultivation is “hidden”, then trafficking costs will never be very low since the risks posed to farmers also exist for traffickers in source countries. However, if subsequent trafficking costs decrease, competition between traffickers will increase and farm-gate prices will rise. When price is seen to outweigh risk, farmers will be encouraged to expand levels of cultivation.

It seems reasonable to assume that heroin supplies from the Golden Triangle region in South-East Asia to the domestic market of Australia will be characterised by relatively high trafficking costs at all times. This conclusion arises from the following observations:

- geographical distance requires a relatively large number of “heroin miles” to be negotiated;

- the source country and destination country are separated by several transit States (which may have large potential markets for heroin);
- there is a need to use air or sea transport to reach the Australian border, which should increase the trafficking costs substantially; and
- Western governments, such as Australia's, regard drug law enforcement as a relatively high priority.

This suggests that the flow of heroin to Australia is likely to fluctuate to some extent and drops in supply may be experienced when local conditions lower cultivation levels in the source country. In short, the high retail value of the Australian heroin market is unlikely to benefit traffickers further up the supply chain (see Reuter & Greenfield 2001). Those individuals will be more concerned with immediate needs to reduce the risks of trafficking and receive optimal returns on their investment. In "lean" years, other markets closer to source, and with fewer trafficking costs (for example, the Asian markets) may simply offer a better proposition. In 1996, a scenario was considered by Australia's Office of Strategic Crime Assessments (OSCA) which made use of many of the supply indicators available at that time. The conclusion was reached that a shortage of heroin might be expected within five years in countries located at the tail end of international trafficking routes (such as Australia).

The preliminary model of heroin supply reported here does not take into account every factor that may, to some extent, affect drug flows (for example, climatic influences). The purpose of the model is simply:

- to encourage discussion about the influence of "beyond-the-border" heroin supply on subsequent domestic drug availability; and
- to encourage systematic collection and analysis of a variety of drug supply indicators for general academic use, including:
 - drug price/purity ratios at various stages of the supply chain;
 - comparative estimates of the transportation costs and perceived risks associated with different trafficking routes;

- the costs and risks associated with importation into different destination markets.

The model can be applied to the sources of all organic drugs. But Australia's historical association with heroin from the Golden Triangle, as well as recent reports of a shortage of heroin in local Australian markets, suggests that this market is a good starting point for the development of supply theory and for devising systematic collections of indicators to inform subsequent drug market research and policy.

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