THE DEMAND FOR METHADONE MAINTENANCE TREATMENT IN AUSTRALIA

Wayne Hall

Technical Report N$^{o.}$ 28

The Demand for Methadone Maintenance Treatment in Australia

Wayne Hall

Director

National Drug and Alcohol Research Centre,

University of New South Wales

Technical Report No. 28
ISBN No 0-947-229-48-5

8 NDARC 1995

TABLE OF CONTENTS **Page**

Summary 1

Background 2

1. Methods of Examining Number of Heroin Users 3
   - 1.1 Sample Surveys of Drug Use 3
   - 1.2 Multiplier Methods 3
   - 1.3 Capture-Recapture Methods 4

2. Estimates of the Number of Australian Heroin Users 5
   - 2.1 1984-87 5
   - 2.2 1988-93 6

3. Estimated Population Prevalence of Opiate Dependence 8

4. Validity of the Estimates 9

5. Estimating Unmet Demand 10

Acknowledgements 10

References 11

Summary

This paper attempts to estimate the potential demand for methadone maintenance treatment in Australia. It begins with a review of the strengths and weaknesses of different methods of estimating the number of regular or dependent heroin users in Australia, namely, sample surveys of drug use, multiplier methods, and capture-recapture estimates. Because no single method of estimation is superior to all of the others, a number of methods (those last used in 1988 on data for the period 1984-1987) were applied to data from the period 1988-1992 to estimate changes in the number of regular or dependent heroin users in Australia over the period 1984 to 1992. The number of heroin dependent users currently in methadone maintenance treatment were compared with the estimated number of dependent heroin users in the population to indicate what proportion of current users were in methadone treatment.

The estimates of the number of heroin users in Australia in 1988-1992 indicate a fair degree of uncertainty. Nevertheless, all estimates all showed an increase on the estimated number of dependent heroin users in Australia in 1984-1987. The increase in the multiplier estimates of the number of heroin users in methadone maintenance treatment probably reflects an increase in the availability of methadone treatment during the period. This is less likely to be true of any of the other estimates.

The median estimate for the various methods in each time period shows an increase from approximately 34,000 (range 25,000 - 86,000) in 1984-1987 to approximately 59,000 (range 49,000 - 150,000) in 1988-1992. Population rates calculated on the midpoints of these range of estimates suggest that the population prevalence of dependent heroin use has increased from 4.5 to 7.2 per 100,000 between 1986 and 1990. On these estimates, the proportion of heroin users currently in methadone treatment has increased from approximately 17% in 1987 to approximately 30% in 1992. Even if we allow that not all dependent heroin users are interested in methadone maintenance treatment, there is still probably substantial unmet demand for this form of treatment.

Background

The number of places in methadone maintenance treatment in Australia has steadily expanded over the past 10 years (Ward et al, 1992) from 2,000 in 1985 to approximately 15,000 in 1994. This increase is largely a consequence of the decision taken by the Special Premiers' Conference in 1985 to increase the availability of methadone treatment, although it has also been influenced by other factors. These include fears of HIV infection driving users into treatment, and subsequent changes in treatment policies in some programs that have made methadone treatment more attractive to the client group, such as, easier access, liberalisation of clinic rules on take-away doses, and the absence of adverse consequences of continued illicit drug use.

One of the questions most often asked about methadone maintenance treatment is whether the number of patients accepted into treatment will continue to increase indefinitely. Behind this question is the further one: are the numbers of regular and dependent heroin users in Australia increasing, decreasing or remaining the same? The answer to this question is often seen as especially relevant to assessing how much unmet demand there is for methadone maintenance (and other forms of drug treatment). The assumption is usually made that the discrepancy between the number of heroin users who are currently in treatment and the total number of regular heroin users in the population represents the unmet demand for treatment. The latter assumption is a simplification for reasons to be discussed below.

There are a number of obvious difficulties in attempting to estimate the number of regular heroin users there are in the community. Heroin use is illegal and hence difficult to study. It is a stigmatised activity that is usually practised in private between consenting adults who prefer that others not know about their drug use. There is no universally accepted definition of "regular" or "dependent" heroin use. And there are no well tested and unbiased methods available to produce a credible estimate of the number of people who make up such "hidden populations". A variety of different methods have nonetheless been used in an attempt to estimate their numbers, all of which have their problems (Taylor, 1989).

1. Methods of Examining Number of Heroin Users

1.1 Sample Surveys of Drug Use

The most direct approach, conducting population surveys of drug use, is not well suited to the task of estimating the number of heroin users in the population. First, household surveys are likely to under-sample heroin users whose lifestyle makes them less likely to live in conventional living arrangements. They are also less likely to participate in a household survey because they are not at home at the time the interviewer calls, or they may be more reluctant to agree to be interviewed if they are at home. Second, even if heroin users are included in a sample survey and they agree to be interviewed, their heroin use is likely to be under-reported because it is illegal. Third, the definition of a regular or dependent user in drug use surveys is at best crude. Most surveys only ask about the frequency of heroin use over a lifetime or in the past year, neither of which provides a satisfactory indication of heroin dependence or even regular use. Fourth, in most Australian household surveys heroin use is a rarely reported event. In the National Drug Strategy surveys, for example, the proportion who have ever used heroin is rarely greater than 1% and the proportion who have used in the past year is smaller still. Consequently, the numbers of heroin users identified in national surveys with a sample size of around 3,000 is very small (e.g. 30 persons who have ever used heroin, and less than 10 who have used in the past year). The resulting estimates of their numbers in the general population are therefore imprecise (Larson, 1992).

1.2 Multiplier Methods

A popular way to estimate the number of heroin users in the population has been to multiply the number of heroin users in some accessible population, e.g. persons in treatment for opiate dependence by a factor (e.g. 6 or 10) that is presumed to reflect the ratio of heroin users in treatment to the numbers of heroin users in the community who are not in treatment. This approach has the advantage that it is simple and easy to understand. It also begins with a count of the number of persons who one can be reasonably confident are regular heroin users (even if it is only those users who have experienced problems as a consequence of their heroin use). Multiplier methods nonetheless have their problems.

First, multiplier methods presuppose that we already know what we need to know, namely, the number of heroin users in the population, since this is required to estimate the multiplier. Second, the attempts that have been made to estimate the multiplier are often crude guesses at best and of uncertain value even in the settings in which they were originally derived; their use in new settings is even more questionable.

For example, the recommendation to use multipliers of 100-200 for opiate-related deaths derives from data collected on American heroin users in New York in the early 1960s (Larson, 1992) which suggested that 0.5 to 1% died per annum. The multipliers of 6 to 10 used for the number of persons in treatment for opiate dependence are based on data collected in London in the early 1980s (Hartnoll et al, 1985). It would be unwise to assume that either of these multiples has remained constant in recent times in the same locations; it is even more heroic to assume that they are applicable to other countries and cultures. We know, for example, that the death rate among heroin users in many countries has increased with the advent of HIV and other infectious diseases. Similarly, the ratio of treated to untreated heroin users can be expected to differ widely

in different health care systems, even over time within the one system as treatment availability, accessibility and attractiveness change. We persist in using these multipliers in the absence of anything that is demonstrably superior.

1.3 Capture-Recapture Methods

The most widely used method of estimating the number of heroin users in Australia has been the capture-recapture or indicator dilution method (e.g. Duque-Portugal et al, 1994; Kehoe et al, 1992). This method derives from work in population biology where it has been used to estimate the numbers of fish and other animals in wild populations. It requires at least two samples taken from the population of interest, with members of the first sample being returned to the "wild" after being marked. In the case of regular heroin users, the method typically involves the use of two or more sets of records (e.g. of arrests or treatment utilisation) as the analogue of samples, and individuals' names (or other unique identifiers) provide the equivalent of "marking".

The rationale of the method is that the ratio of the original sample size (m) to the total population (N) is the same as the ratio of the number of recaptured individuals (r) in the second sample to the number in the second sample (s). That is,

$$m/N = r/s.$$

After algebraic manipulation, the total population size can be estimated by the formula:

$$N = sm/r$$

In practice, more refined versions of the formula are used to reduce bias in estimation (see Kehoe et al, 1992; Larson, 1992).

The principal attractions of the capture-recapture method are that it has a clear mathematical rationale and it produces a confidence interval around the estimate which provides an indication of the uncertainty of the estimate. Its major disadvantage is that it only provides valid estimates when its underlying assumptions are correct. These are: that all members of the population have an equal chance of being captured, that there are no entrants to or losses from the population in the time between the samples, and that the chances of being captured in the first sample do not influence the chances of being re-captured.

The work of Sandland (1984, 1986) suggests that the assumptions of the traditional capture-recapture method are frequently false in the case of heroin users, and moreover, that the most likely consequence of the violation of these assumptions is that estimates of the number of heroin users in the population are seriously biased. Sandland has provided improved capture-recapture methods that reduce the seriousness of these problems but their application has been limited by the shortage of sufficiently large data sets to which they can be applied. Nonetheless, the modified capture-recapture method probably provides the best of the available methods.

2. Estimates of the Number of Australian Heroin Users

2.1 Using Data Sources for 1984-87

Because no single method is satisfactory the preferred approach to estimating the number of heroin users in Australia has been the use of multiple methods (of hopefully independent imperfection) that converge upon a range of estimates. For example, a series of estimates of the number of heroin users in the Australian population were produced in 1988 by the National Drug Abuse Data System (NDADS). It used a number of different methods to produce a range of estimates of the number of heroin users in Australia in the middle 1980s (see the first two columns of table 1). These were derived as follows.

1. A capture-recapture estimate of the number of heroin users in NSW in 1984 (10,000) was multiplied by a factor of 3 (the estimated ratio of the number of heroin users in NSW to number in the rest of Australia). This multiplication suggested that there were 30,000 regular dependent heroin users in Australia.

2. The number of opiate-related deaths in Australia in 1986 (namely, 249) was multiplied by the commonly used multipliers of 100 and 200 to give estimates of between 25,000 and 50,000 regular dependent Australian heroin users.

3. A household survey estimate of the percentage of the population that had injected a drug in the past year (1.8%) was used to estimate that there were 172,000 persons who had injected a drug in the past year. This was known to be an overestimate of the number of heroin users because it included persons who had injected drugs other than heroin. A more conservative estimate can be derived from the percentage of persons who reported using heroin in the previous year in the 1988 NCADA household survey (the results of which were not available at the time of the NDADS report). The latter survey provides a much lower estimate of the number of persons who had used heroin in the past year, namely, 28,000.

4. The number of persons in methadone treatment in Australia in 1987 (namely, 5,735) was multiplied by two factors. The first was 1.5 (to estimate the number of all persons in opiate treatment) and the second two factors were 6 and 10 (Hartnoll et al's factors) to give estimates of 52,000 to 86,000 regular heroin users.

5. The first estimate of the number of regular users (30,000) was multiplied by 2 and 3 (Kozel and Adams, 1986 estimate of the ratio of irregular to regular heroin users in the USA). These gave estimates of 60,000 to 90,000 irregular and "recreational" heroin users. These are in addition to the 30,000 to 50,000 regular dependent heroin users.

2.2 Using Data Sources for 1988-93

The NDADS (1988) estimates have been updated as follows using data gathered between 1988 and 1993 (see columns three and four of table 1).

1. The capture-recapture estimate of the number of heroin users in NSW in 1988-89 derived by Kehoe et al (1992) (namely, 15,000) was multiplied by a factor of 3 to give an estimate of the number of regular heroin users in Australia of 45,000.

2. The number of opiate-related deaths in Australia in 1992, namely, 492, (National Drug Strategy, 1994) was multiplied by factors of 100 and 200 to give estimates (to the nearest 1000) of 49,000 to 98,000 regular heroin users in Australia.

3. The 1991 National Drug Strategy household survey estimate of the percentage of the population that had used heroin in the past year (0.3%) was multiplied by the relevant population estimate to give an estimate of 36,000 persons who had used heroin in the past year in Australia.

4. The number of persons in methadone treatment in 1991 (approximately 10,000 from Ward et al, 1992) was multiplied by 1.5 (to estimate the number of all persons in opiate treatment) and then by 6 and 10 (Hartnoll's factors) to give estimates of 90,000 to 150,000 dependent heroin users.

5. Multiplying the first estimate of the number of regular users (45,000) by 2 and 3 (Kozel et al's 1985 estimate of the ratios of irregular to regular users in the USA) gives estimates of between 90,000 and 135,000 irregular heroin users, in addition to the regular heroin users.

Table 1: Estimates of the number of Australian heroin users in 1984-1987 and 1988-1993 from various sources by different methods

Method	1984-87 Range	1984-87 Midpoint	1988-1993 Range	1988-1993 Midpoint
1. Multiple (x 3) of NSW capture-recapture estimate		30,000 [1]		45,000 [3]
2. Multiples (x 100 and x 200) of number of opioid deaths in Australia	25,000 50,000	37,500 [1]	49,000 98,000	73,500[4]
3. Multiples of % of population who used heroin in the past year	0 56,000	28,000 [2]	0 105,000	36,000 [5]
4. Multiples (x 4 and x 15) of number of heroin users in treatment	52,000 86,000	69,000 [1]	90,000 150,000	120,000 [6]
Estimates N **regular** heroin users *	25,000 86,000	34,000	49,000 150,000	59,000
5. Estimates N **irregular** heroin users *	60,000 90,000	75,000 [1]	90,000 135,000	113,000
Estimates Total N of heroin users *	85,000 176,000	109,000	139,000 285,000	172,000

* to nearest 1000

Sources:

1. NDADS, 1988
2. Larson, 1992 using National Household Survey, 1988;
3. Kehoe et al, 1992
4. National Drug Strategy, 1994
5. National Household Survey, 1991
6. Projection of figures in Ward et al, 1992

3. Estimated Population Prevalence of Opiate Dependence

It is necessary to estimate population rates of opiate use to take account of changes in the size and composition of the Australian population between the middle 1980s and the early 1990s. This was done as follows (see Table 2). The median estimates of the numbers of regular and irregular heroin users from table 1 were divided by estimates of the population in the age groups in which most opiate users are found (namely, 15 to 44 years) for 1986 and 1990 (the nearest years to each of the estimates) from data provided by the Australian Institute of Health (1992).

These calculations suggest that the estimated prevalence of regular heroin users (per 1,000 of population) had increased from 4.5 in 1986 to 7.2 in 1990. The increase in the estimated prevalence of irregular heroin users had increased from 9.9 to 13.8 per 1000 while the estimated prevalence of all heroin use had gone from 14.4 to 21.0 per 1000 of population. These increases are statistically significant for both regular (OR = 1.62, 95% CI: 1.60, 1.64), and irregular users (OR = 1.41, 95% CI: 1.40, 1.42).

Table 2: Estimated population prevalence (per 1000 population) of regular and irregular heroin use 1986 and 1990.

Estimate	1986 Number	Rate per 1000	1990 Number	Rate per 1000
1. Regular heroin users	34,000	4.5	59,000	7.2
2. Irregular heroin users	75,000	9.9	113,000	13.8
3. Total Number of heroin users	109,000	14.4	172,000	21.0
Population size (15-44 years) [1]	7,582,629		8,171,048	

Source: 1. Australian Institute of Health and Welfare, 1993.

4. Validity of the Estimates

A number of caveats have to be entered about these estimates. First, within each time period, the range of estimates produced by different methods varies widely. In both periods the largest estimate is approximately 2 to 3 times the size of the smallest. Second, the imprecision of those estimates is considerable. For example, there is a very wide 95% confidence interval around the estimates of the number of persons who have used heroin in the past year derived from household surveys. In 1988 the confidence interval ranged between zero and 56,000 while the confidence interval around the estimate for 1993 ranged between zero and 105,000. The variability between estimates mean that we must not take any of the individual estimates too seriously.

Third, the estimate based on multiplying the number of persons in methadone treatment is artefactually increased by the increasing availability of this form of treatment in the period 1985 to 1993 (Ward et al, 1992). It accordingly must be discounted in deciding whether the number of heroin users in Australia has increased over this period. If this estimate is ignored, for example, the median estimates of the number of heroin users in the two periods becomes 30,000 and 45,000 (rather than 34,000 and 59,000).

These caveats notwithstanding, it is tempting to argue that since all estimates have consistently increased over the two periods (by 29% to 85%) that there has been a real increase in the number of heroin users in Australia between 1984 and 1993. Before drawing this conclusion we need to resolve two apparent inconsistencies between other evidence and the apparent increase in the number of heroin users. First, the best serial estimates of the number of heroin users in NSW (those provided using Sandland's methods by Muir, 1990) suggest that the number of heroin users in NSW declined in the middle 1980s. However, the decline only occurred at the end of the study period (in the last point in the time series which had consistently increased until then) and the time series does not extend into the period covered by the second set of multiple estimates reported here.

Second, an apparently substantial increase in the number of heroin users also appears to conflict with the fact that the average age of persons in methadone treatment (and other forms of drug treatment) has increased in Australia over the period 1980 to 1992 (Hall, Chen and Evans, 1993; Swift et al, 1993). However, the average age of methadone clients has not increased by a year per year (as would be necessary if there had been no new recruits to heroin use). Rather the increase has been more like 3 months per year which is consistent with continuing recruitment to heroin use over the past decade or so.

5. Estimating Unmet Demand

Even when the considerable uncertainties in these estimates are set aside, it would be unwise to assume that the potential demand for methadone treatment is the simple discrepancy between the estimated number of regular heroin users in the population and the number who are currently in methadone maintenance treatment.

First, not all regular heroin users are interested in treatment in general, or in methadone maintenance treatment in particular. An unknown but probably substantial minority will cease their use without any professional assistance (Biernacki, 1986). Second, demand for treatment (or any service) is dynamic: it will be affected by its availability, cost, and attractiveness to potential users. The increased availability of methadone treatment over the past decade has probably contributed to an increased demand. Recent policy changes may be expected to have conflicting effects on demand. Changes in the method of delivery (such as direct costs to users) may be expected to reduce demand while more liberal attitudes towards continuing drug use while in treatment and to giving take-away doses of methadone can be expected to increase demand.

Accepting these caveats, the current estimates indicate that there may still be a substantial unmet demand for methadone treatment even though its availability has dramatically increased over the past decade. If we ignore the estimate derived from the treatment multiplier and use the median figure in table 1 for the period 1988-1993 then approximately 30% of the estimated 50,000 regular or dependent heroin users in Australia were enrolled in methadone treatment in 1994. This compared with approximately 17% in 1987. This suggests that although the proportion of regular heroin users enrolled in methadone maintenance treatment has substantially increased over the past five years or so less than half of regular heroin users have been enrolled. The fact that there has been no sign of a slackening in demand for methadone treatment suggests that demand has not been fully met even if a majority of heroin users are not interested in enrolling in methadone treatment.

Acknowledgements

I would like to thank Kate Dolan, Don Weatherburn and Alex Wodak for their comments on an earlier draft of this report.

References

Australian Institute of Health and Welfare (1993) **Australia's Health 1992**. Canberra: Australian Government Publishing Service, 1993.

Biernacki, P. **Pathways from Heroin Addiction: Recovery Without Treatment.** Temple University Press: Philadelphia, 1986.

Duque-Portugal, F., Martin, A.A. and Taylor, R. Mark-recapture estimates of injecting drug users in Sydney. **Australian Journal of Public Health**, 1994, 18, 201-204.

Hall, W., Chen, R. and Evans, B. Clients admitted to "The Buttery", a therapeutic community, 1980-1992. **National Drug and Alcohol Research Centre Technical Report Number 20** National Drug and Alcohol Research Centre, 1993.

Hartnoll, R., Lewis, R. Mitcheson, M. Bryer, S. Estimating the prevalence of opioid dependence. **The Lancet**, January 1985, 203-205.

Kehoe, L., Hall, W., and Mant, A. Estimates of the number of injecting drug users in a defined area. **Australian Journal of Public Health**, 1992, 16, 232-237.

Kozel, N.J. and Adams, E.H. Epidemiology of drug abuse: an overview. **Science**, 1986, 234, 970-974.

Larson, A. **Estimating the number of heroin users in the ACT**. National Centre for Epidemiology and Population Health, Canberra, 1992.

Muir, C. The latest estimate of the number of heroin users in NSW. **Proceedings of the Second National Drug Indicators Conference, 1990**. (Ed) G. Wardlaw. Canberra: Australian Institute of Criminology, 1991.

National Drug Abuse Data System **How many heroin users are there in Australia?** Statistical Update Number 5, March 1988.

National Drug Strategy. Statistical Update **Drug Caused Deaths in Australia 1991 and 1992**. Issue 3, March 1994.

Sandland, R.L. **Methods of Estimating the Number of Heroin Users in NSW.** Project No. MAN/N83/DAA/1 Sydney: Siromath Pty Ltd.

Sandland, R.L. **Estimation of the Number of Heroin Users in NSW Using Police Arrest Data: Development of a Statistical Model.** Research Grant Report Series B 86/1 Sydney: NSW Drug and Alcohol Directorate.

Swift, W., Darke S., Hall, W., and Popple, G. **Who's Who? A Report on the Characteristics of Clients seen at We Help Ourselves 1985-1991**. Technical Report No. 14, National Drug and Alcohol Research Centre 1993.

Taylor, R. A review of methods for estimating the size of subgroups at risk of infection with human immunodeficiency virus and development of proposals which could be used to estimate these populations in the field. Department of Public Health, University of Sydney, December 1989.

Ward, J., Mattick, R., & Hall, W. **Key Issues in Methadone Maintenance**. University of New South Wales Press, Sydney 1992.