Amphetamine Users in Australia: Population Trends*

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Abstract

This report presents results on the prevalence of amphetamine user population in Australia and its trends during the period 1971-1997. The study is based on data from the 1998 National Drug Strategy Household Survey (NDSHS ‘98). From the NDSHS ‘98 data it is possible to infer, for each year between 1971 and 1997, the total number of amphetamine users, the number who were initiated in a given year and the number that quit using the drug. Age distributions are also emphasized. The problem of classifying amphetamine users into light and heavy users is briefly mentioned. In addition, the report notes some of the most striking similarities and differences between the population trends of amphetamine and heroin users.

Key words: Amphetamine users, Drug epidemics, Initiation, Quitting.

1 Introduction

According to the November 1998 report of the Ministerial Council on Drug Strategy, the coordinated, integrated approach advocated by the Council to “reduce drug-related harm in Australia” includes the following key components: A partnership approach, A balanced approach, Evidence-based practice and Social justice.

This is the second report on a joint collaborative research project between the Drug and Alcohol Services Council of South Australia (DASC) and the Centre for Industrial

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and Applicable Mathematics (CIAM) at the University of South Australia. The project was initiated in March, 2000 with the goal of exploiting modern tools of dynamical systems and control theory to find an optimal mix of drug prevention and treatment strategies that would seek to achieve a balance between demand-reduction and harm-reduction strategies.

However, in order to develop a dynamic population model in a manner that captures the true evolution of a given population it is first necessary to examine and understand historical data describing the trends of the population under investigation. Consequently, this project began by examining the available data describing the population of Australian heroin users (see [8]). In this report we repeat the analysis in [8] but for the case of Australian amphetamine users.

The rationale for this seemingly repetitive task is two-fold. Firstly, amphetamines constitute a major “problem drug” in Australia and as such the understanding of the historical user population trends is important. Secondly, the comparison of the results with those for heroin users provides an opportunity to check the consistency of the data reconstruction technique developed in [8]. In order to make this report self-explanatory, the data reconstruction technique is repeated here in parallel with the derivation of the results.

The results of this study indicate that there is a strong consistency in the population trends of heroin and amphetamine users in Australia. However, as the absolute numbers of amphetamine users are significantly larger, the results of our analysis are even more reliable in this case. Perhaps, the main finding can be captured in Figure 1.

In Figure 1 we see that while there is an upward trend in the user populations of both drugs, the rate of increase - in recent years - is much greater in case of amphetamine users. Interestingly, perhaps, the trends were extremely similar during the period 1971-1978, after which the population of amphetamine users began its sharp climb. A close examination of Figure 1 reveals that after 1979, the gap between the two populations grows by roughly 20% each year. The apparent hiatus in the upward trend for amphetamines in 1988-1989 appears throughout our calculations and is also detectable in the population of heroin users. At this stage we do not know if this is due to a problem in the data set or due to an underlying cause such as shortage of drugs on the Australian “market” during that period.

2 Preliminaries

2.1 Data source

This report is based on data from the 1998 National Drug Strategy Household Survey (NDSHS ‘98). The NDSHS ‘98 is the sixth in a series of national household surveys over the period 1985–1998 to examine awareness, attitudes and behaviour related to
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Figure 1: Comparison of Number of Heroin and Amphetamines Users
drugs, usage of drugs and drug problems. In particular, the household surveys were conducted in the years 1985, 1988, 1991, 1993, 1995, and 1998. These surveys are significantly different from one another in terms of their questionnaires and the way they were conducted. Since the data in NDSHS‘98 are far richer than in NDSHS ‘95 and the previous surveys, the time history (or trends) presented in this work are inferred primarily from these data.

Three separate but related samples were collected in NDSHS ‘98. These are listed in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1</td>
<td>4,012</td>
<td>Persons of age ≥ 14</td>
</tr>
<tr>
<td>Sample 2</td>
<td>1,983</td>
<td>Persons of age ≥ 14 living with at least another person of age ≥ 14 in the same household</td>
</tr>
<tr>
<td>Sample 3</td>
<td>4,035</td>
<td>Persons of age ≥ 14 and ≤ 39 living in capital cities only</td>
</tr>
<tr>
<td>Total</td>
<td>10,030</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: The three samples collected in NDSHS ‘98.

It is noted in the NDSHS ‘98 Technical Report [2] that the questionnaires for Samples 1-3 are identical in terms of the issues addressed and that the only differences are due to the different methodologies being employed. It is concluded in the same report that there are very few significant differences between the samples in respect of drug usage data.

2.2 Counting of the number of users

As mentioned in the Introduction we shall use the same inference process as in [8] to construct estimates of population of amphetamine users during the years 1971-1997. Furthermore, to save the reader the inconvenience of referring back to [8], the reconstruction process is repeated in this report.

Based on NDSHS’98 the number of respondents who ever used amphetamines is 1103. From this, one can infer the number of amphetamine users in 1997 - one year before the time of the survey - in a rather straightforward manner by merely counting the number of those respondents who reported last use in 1997. However, if one is interested in constructing the time history of the number of users in the previous years, then the task is more complicated.

The following three questions are instrumental in reconstructing the relevant counts of users in preceding years:

- **X3L2, X3L3**: Ages of first and last use, respectively,
• **ZZ1B**: Current age,

where the capitals X and ZZ refer to Sections X and ZZ, respectively, of the NDSHS'98 questionnaire.

The following example explains the use of these questions more clearly. Suppose that an individual gave the following answers to questions X3L2, X3L3, and ZZ1B:

<table>
<thead>
<tr>
<th>Question</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of first use</td>
<td>21</td>
</tr>
<tr>
<td>Age of last use</td>
<td>30</td>
</tr>
<tr>
<td>Current age</td>
<td>33</td>
</tr>
</tbody>
</table>

Given the fact that this person is 33 years old in 1998, he or she obviously started using amphetamines in 1986 and stopped in 1995. Consequently, this individual is considered to be a user in each year of the period 1986-1995.

The difference between the current age and the age of first use is subtracted from the survey year 1998 to get the year of first use, which we also refer to as the year of initiation. The year of initiation in the above example is 1986. Similarly the difference between the current age and the age of last use is subtracted from 1998 to get the year of last use, or the year of quitting. The year of quitting in the above example is 1995.

Not all the respondents who said they used amphetamines before reported an age of their first or last use. Indeed, out of the total of 1103 of these respondents, 255 did not report the age of first use, and 365 did not report the age of last use. Since we do not wish to simply discard the information supplied by these respondents we need to interpret information contained in the responses to certain other relevant questions in order to estimate the ages of first and/or last use. Of course, this interpretation is based on certain assumptions or “decision rules” that will be discussed in more detail later on.

Especially in estimating an age of first use for each of those respondents who did not report it in the questionnaire, an insight about the distribution of initiation age is useful. Consequently, in the next subsection, we consider the distributions of the ages of users, initiation and quitting.

### 2.3 Age distributions

#### 2.3.1 Distribution of the age of initiation

The graph in Figure 2 is based on those 848 respondents who reported the age of first use. It is an asymmetric distribution; skewed to the left. The average age of initiation is 20.2. Note that 16-22 age group comprise about 64% in the overall population of those who were initiated. The distinctive peak in the 18-20 age group is also noteworthy.

The above reflects the susceptibility of the younger age groups to amphetamines which is also consistent with the heroin users. However, the latter population has
Figure 2: Distribution of the age of Initiation to Amphetamines. Greater variability, as indicated in the box-plots displayed in Figure 3.
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2.3.2 Distribution of the age of quitting

The graph in Figure 4 is based on those 410 respondents who reported the age of quitting. Note that the age of quitting is the same as the age of last use only when a person did not use amphetamines in the past 12 months. Average age of quitting is 23.4. Quitting age appears to be spread over the late teens and mid 20’s. The peak at the age of 30 is noteworthy but we do not offer any explanation as to its causes. Perhaps, it would be worthwhile for social scientists to explore whether this might be due to the fact that at age 30 many young people may acquire new responsibilities such as caring for children, or these respondents might have chosen to report age 30 for the reason of not being sure about the exact age of their quitting and so just giving a rounded figure of 30 instead as the closest to the exact age.

The consistency between the distribution of the age of quitting between heroin and amphetamine users is very strong and can be observed in the box-plots displayed in Figure 5. Unlike the age of initiation the mean of the age of quitting is very slightly higher in the case of amphetamine users.
Figure 4: Distribution of the age of Amphetamine quitting.

Figure 5: Comparison of the age of quitting distributions.
Figure 6: Age distribution in the 1997 of Amphetamine users.

2.3.3 Distribution of the age of users

The graph in Figure 6 is based on those 452 respondents who reported that they were users in the past 12 months. Average user age in 1997 was 24.5, which is greater than both the average initiation and quitting ages. Of course, this indicates that quitting rate is less than initiation rate. This graph has a more regular distribution than the corresponding graph for heroin users (see Figure 3 in [8]).

Perhaps, the best way to compare these two distributions is with the help of the box-plot displayed in Figure 7. We note that the variability of the ages of amphetamine users (in 1997) is smaller than that of heroin users (also in 1997). Also, on the average, the amphetamine users were younger.

2.4 Rules for inferring an initiation age

We now return to the problem of inferring the initiation age for those respondents who are known to have used amphetamines but who omitted to answer the question concerning their age at first use.

Let $a_I$ be the age of first use, $a_l$ the age of last use, and $a_c$ the current age. Recall that the average initiation age is 20.2 years as pointed out in Section 2.3.1. On the
basis of this average initiation age we devise two decision rules for inferring the missing age of first use. More precisely,

- if \( q_i \) is reported, then set \( a_f \) to 20 or to \( q_i \), whichever is smaller; or
- if \( q_i \) is not reported then set \( a_f \) to 20 or to \( a_c - 1 \), whichever is smaller.

Note that after applying the above rules to every user who did not report an age of first use we obtain a complete set of 1103 initiation ages; one for every user.

2.5 Rules for inferring an age of last use

The next step is to devise reasonable decision rules for inferring the age of last use for each missing instance of the latter.

There are two diametrically opposite assumptions that can be made in the case of individuals who failed to report the age of last use\(^1\).

(C1) Optimistic rule. The age of last use is the same as the age of first use.

\(^1\) Recall, that we are discussing only the 1103 respondents who answered affirmatively to the question: “Have you ever tried amphetamines for non medical purposes?”
Figure 8: Lower and upper population envelopes resulting from (C1) and (C2), respectively.

(C2) Pessimistic rule. The respondents in this category are still using amphetamines.

Clearly, cases (C1) and (C2) represent two extreme situations. If the projection results for each case did not greatly differ from one another, then one could have reliably used either one of these cases as an assumption. However, as can be seen from Figure 8, the two population trends obtained assuming these two extreme cases are significantly different from each other. Thus, they constitute the lower and upper “envelopes” that are very likely to contain the true population trend between them.

Incidentally, the graphs of these lower and upper envelopes are distinctly more “regular” than the corresponding graphs for heroin users (see Figure 4 in [8]). This could be due to the fact that the larger numbers of amphetamine users eliminate the fluctuations resulting from the small sample sizes of heroin users. However, the resulting approximate “smoothness” of the graphs suggests that it will be easier to develop a good functional form for the corresponding variables.

Instead of using either one of (C1) or (C2), we develop an in-between, moderate assumption which is effectively a weighted combination of the preceding two rules. To develop this assumption, we incorporate responses to two more questions from the survey:
<table>
<thead>
<tr>
<th>No.</th>
<th>O2</th>
<th>X4L</th>
<th>Case Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No or missing response</td>
<td>Don’t currently use, or missing response</td>
<td>Answers to O2 &amp; X4L suggest (C1)</td>
</tr>
<tr>
<td>2</td>
<td>No or missing response</td>
<td>Any answer other than Don’t currently use, and missing response</td>
<td>Answers to O2 &amp; X4L suggest (C2)</td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td></td>
<td>(C2)</td>
</tr>
</tbody>
</table>

Table 2: Combinations of responses and missing responses, and the resulting case assumed.

- **O2**: Have you used amphetamines for non medical purposes in the past 12 months?
- **X4L**: How often do you currently use amphetamines?

For those users who did not report the age of last use, possible responses to O2 and X4L, including missing responses, are classified in Table 2. According to these combinations, any given user in this category, will have his or her age of last use determined either by (C1) or (C2), in accordance with the classification specified by the third column of Table 2. The interpretation of a missing response errs on the conservative side. For instance, a person who missed both of these questions is classified under (C1), namely, as a “one-year” user. On the other hand, some users classified by row 2 of that table (as current users) may have actually quit at the time of the survey in 1998; however, we cannot be sure of this because of the lack of consistent responses on both questions O2 and X4L.

The resulting “moderate” classification results in a projected profile of users as depicted by the in-between curve in Figure 9. We note in this figure the apparent “anomaly” in the years 1988-1989 that was already mentioned in the Introduction.

We now introduce two additional assumptions under which the projections of the population of users can be estimated.

(A1) A person remains a user in each year between the years of first and last use, inclusively.

(A2) If the years of first and last use are the same then the person in question is a user for that year only.

### 2.6 Counting of numbers of users in the years 1971-1997

It is envisaged that this study on the amphetamine users in Australia will be combined and compared with the studies on other drugs, such as heroin and/or cocaine. The
Figure 9: Population trend under the moderate assumption and the lower and upper envelopes.
study by the UniSA researchers (Kaya et al. 2001) on heroin considered the age
group 15-54, which is the same age group as in Hall et al. (2001) and in the studies
cited therein. We will continue focusing on the same age group in this study of the
amphetamine users.

Since there are very few significant differences reported between the samples listed
in Table 1 in respect of drug usage data, we first combine these three samples and then
create two new samples for the age groups 15-39 and 40-54, respectively, for every year
of our concern, namely years between 1971-1997.

The particular break up of the age groups at 39 is due to the consideration of the
age group 14-39 in Sample 3 in Table 1. The sizes of the two new samples, for the year
1998, are given in Table 3.

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1</td>
<td>6928 Persons of age 15 - 39</td>
</tr>
<tr>
<td>Sample 2</td>
<td>1400 Persons of age 40 - 54</td>
</tr>
<tr>
<td>Total</td>
<td>8328</td>
</tr>
</tbody>
</table>

Table 3: The new samples considered for the year 1998.

Within each of these samples and for each year the number of cases of initiation and
of last use are counted. Let these be denoted by \( I_i^c \) and \( Q_i^f \) for Sample 1, respectively,
and similarly by \( I_2^c \) and \( Q_2^f \) for Sample 2. We will refer to \( I_i^c \) and \( Q_i^f \), \( i = 1, 2 \), as yearly
initiation and quitting counts, respectively. Transitions between the two age groups are
also taken into account in the calculations. When a user ceases to be 39 years old and
becomes 40, the value of the so-called transition quitting, namely \( Q_T^f \), from the lower
age group is increased by one for that year. The value of another variable, namely the
transition initiation, or \( I_T \), for the upper age group is also increased by one for that
year. Then one can express the (cumulative) counts of users for each group, namely
\( N_i^c(t) \) and \( N_2^c(t) \), in year \( t \) as

\[
N_i^c(t) = \sum_{j=1}^{t} I_i^c(j) - \sum_{j=1}^{t-1}(Q_i^f(j) + Q_T^f(j)) \tag{2.1}
\]

\[
N_2^c(t) = \sum_{j=1}^{t}(I_2^c(j) + I_T^c(j)) - \sum_{j=1}^{t-1} Q_2^f(j) \tag{2.2}
\]

where \( i = 1, 2 \).

Note that the above counting procedure is implemented under the assumptions (A1)-(A2).
2.7 Effective sample sizes and projections

Since we are interested in the period 1971-1997 and since we are reconstructing populations of amphetamine users backwards from 1998, we introduce a year index \( s \) which runs from \( 0, 1, 2, \ldots, 27 \) with \( s = 0 \) corresponding to 1998 and \( s = 27 \) corresponding to 1971. We refer to \( s \) as the *backward time variable*, and \( t \) as the *forward time variable*. The variables \( s \) and \( t \) are related by

\[
s = 27 - t
\]

Now, for each value of the year index \( s \) define the following variables:

- \( S_i(s) \) : Effective size of sample \( i \)
- \( P_{a,b}(s) \) : Size of the population between ages \( a \) and \( b \) in Australia
- \( N_i(s) \) : Projected number of users
- \( I_i(s) \) : Count of first time users
- \( I_i(s) \) : Projected number of users who were initiated in that year
- \( Q_i(s) \) : Count of users who quit amphetamine use in that year
- \( Q_i(s) \) : Projected number of users who quit amphetamine use in that year

where the subscript \( i \) refers to Sample \( i \) (as in Table 3), \( i = 1, 2 \), for the particular year \( s \). Note that, from Table 3, \( S_1(0) = 6928 =: S_1 \) and \( S_2(0) = 1400 =: S_2 \). The effective sample sizes \( S_i(s) \) are calculated by

\[
S_1(s) = \frac{P_{15+30+s}(1998)}{P_{15,30}(1998)} S_1 \tag{2.3}
\]

\[
S_2(s) = \frac{P_{40+51+s}(1998)}{P_{40,51}(1998)} S_2 \tag{2.4}
\]

Using \( t = 27 - s \) the “projected” numbers of users, \( N_i(t) \), are then calculated by

\[
N_1(t) = \frac{N_1^*(t)}{S_1(t)} P_{15,30}(t) \tag{2.5}
\]

\[
N_2(t) = \frac{N_2^*(t)}{S_2(t)} P_{40,51}(t) \tag{2.6}
\]

and the total projected number of users in year \( t \) is then given by

\[
N(t) = N_1(t) + N_2(t). \tag{2.7}
\]

The projected numbers of those who were initiated and quit, namely \( I(t) \) and \( Q(t) \), are calculated similarly by merely replacing \( N \) in Equations (2.5)-(2.7) by \( I \) and \( Q \), respectively. Note that initiation, \( I(t) \), and quitting, \( Q(t) \), respectively represent the inflow into and outflow from the population of users in the year \( t \).
3 Results on the Levels of Amphetamine Use in Australia

In this section we apply the methodology developed above to reconstruct the time trends in the population of Australian amphetamine users, over the period 1971-1997. In particular, we focus on the projected number of people who became initiated into amphetamine use (and hence became users) as well as the projected number of those who quit and the total projected number of users. The rationale for including the word “projected” in the preceding sentence is that the extrapolation from data in NDSHS’98 to the entire population rests on the assumption that this survey is, indeed, representative of the Australian population. However, even if this assumption were to some extent inaccurate the data in this survey constitute, perhaps, the best publicly accessible information about the amphetamine user population.

3.1 Initiation

The trend of the projected numbers people who were initiated into amphetamine use is given in Figure 10. While the shape of the overall trend is not unlike that of heroin users (see Figure 6 in [8]), there are also notable differences.

In particular, from an inspection of the bar chart of the initiation history one can identify three “plateaus.” The first plateau stretches between the years 1971–1979 at an approximate level of around 10,000 users per year, the second plateau between 1980–1985 at around 30,000 per year, and the third from 1991–1993 at around 55,000. It may be interesting to examine the government policies in relation to this drug during (or shortly before) a period corresponding to a plateau to try determine whether these plateaus may have resulted from effective implementations of certain prevention initiatives. By the same token, one can search for an explanation of the jumps from a lower plateau to a higher population of users.

3.2 Quitting

The trend of the projected number of people who quit the use of amphetamines is given in Figure 11. It is similar to, but more regular, than the corresponding trend for heroin users (see Figure 7 in [8]).

The three plateaus observed in initiation can also be seen in quitting. These plateaus span roughly the same periods of time at the respective levels of around 5,000, 15,000 and 30,000 users per year.

The reason that the periods of plateaus of initiation and quitting almost coincide is suggested in Section 3.4: Almost 40% of those who are initiated into amphetamines quit using within one year, and the rest is spread rather thinly over ten years or so.
Figure 10: Numbers of people initiated into amphetamine use.
Figure 11: Numbers of amphetamine users who quit.
3.3 Number of Users

The trend of the projected number of people who were using amphetamines is given in Figure 12. The regularity of this graph is its most distinctive feature. To a specialist, it is clear that population of amphetamine users reflects what is known as “exponential growth”. While the latter is an attractive feature from the perspective of mathematical modelling of the corresponding variable, it must be regarded as an extremely worrying trend to a social planner. It demonstrates, that if this growth were to continue unchecked, the population of users would be increasing dramatically in the near future.

In Figure 13 the trends of the numbers of those who were initiated and those who quit are displayed along with the numbers of users, for comparison purposes. Once again, these trends are similar in overall shape to those for heroin users (see Figure 9 in [8]) and, as before, they exhibit more regularity and a dip in years 1988-1989.

It is also useful to observe the time history of the percentage of amphetamine users in different age groups of the population, as displayed in Figure 14. The percentage of users in the 40-54 age group increase from around 0.2% in 1971 to just under 1% in
Figure 13: A comparison of the numbers of users, with those who were initiated and those who quit.
Figure 14: Time history of the percentage of amphetamine users in respective populations.

On the other hand, the growth in the percentage of users in the 15-39 cohort from less than a half of 1% in 1971 to 6.5% in 1997 must be regarded as disturbing since it represents a 13-fold increase.

In general, Figure 14 illustrates that the proportion of prevalence of amphetamine users to the population, as a whole, can be different depending on the age group and the year. For the combined cohort of the 15-54 age group the percentage of the number of amphetamine users (relative to the size of that cohort) ranges from less than .25 of 1% in 1971 to some 4.5% in 1997. For the 15-39 age group cohort the lower end of this range (in 1971) is nearly the same but the upper end in (1997) is almost 6.5%. These upper estimates are considerably higher than the corresponding upper estimates for the population of heroin users (see Figure 10 in [8]). It should be noted that the estimates of the 40-54 age group cohort may be regarded as much more reliable in this case than in the case of heroin users reported in [8] as the sample sizes were very small for the latter.
3.4 Career of Users

Figure 15 shows that about 40% of all users have a career length (of amphetamine use) of less than 1 year.

4 Light and Heavy Users

Many studies, including [3] and [4], differentiate between the so-called “heavy” and “light” drug users; based on the pattern of use. However, this distinction is not a simple one and needs to be made very carefully as the subsequent results will be strongly influenced by the definition of heavy and light users and it would normally be drug dependent\(^2\). In this study we stop short of proposing a rigorous classification. However we focus on the pattern of use which can perhaps be used as a reliable determinant in a future classification.

\(^2\)A heavy amphetamine user will typically have a different pattern of use from a heavy cocaine user.
Table 4 gives the pattern of use of the current users in 1997. We note that this table contains responses to the question X4L concerning the pattern of use of various drugs. When we restrict ourselves to the 1103 respondents who confirmed that they used amphetamines at some time in their life we obtain the numbers in that table. Note that those past users who do not regard themselves as present users (in 1998) responded either with “don’t currently use,” or their response was missing. A classification of light and heavy users can possibly be based on this table which is analogous to Table 4 in [8].

<table>
<thead>
<tr>
<th>Pattern of Use</th>
<th>No of respondents in 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every day</td>
<td>2</td>
</tr>
<tr>
<td>Once a week or more</td>
<td>28</td>
</tr>
<tr>
<td>About once a month</td>
<td>49</td>
</tr>
<tr>
<td>Every few months</td>
<td>61</td>
</tr>
<tr>
<td>Once or twice a year</td>
<td>111</td>
</tr>
<tr>
<td>Less often</td>
<td>65</td>
</tr>
<tr>
<td>Don’t currently use</td>
<td>748</td>
</tr>
<tr>
<td>“Missing”</td>
<td>39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1103</strong></td>
</tr>
</tbody>
</table>

Table 4: Pattern of use of those who were users at the time of the survey.

5 Conclusions

In this report, we presented results that describe certain important trends in the population of Australian amphetamine users during the period 1971-1997. In addition, we compared these results with the analogous trends for heroin users that were reported in [8]. The study revealed the following main findings:

- The population of Australian amphetamine users is much larger than that of heroin users and is increasing at much faster rate.

- For a number of key variables such as age of initiation, age of quitting and the number of users the overall trends and distributions bear many resemblances between amphetamine and heroin users.

- The study identified a number of periods where the initiation rate seemed to level off as well as one period (1988-1989) where the total number of users appeared to drop. These findings call for a non-quantitative explanation.
References


