

# **Estimating The Prevalence Of Opiate Drug Use In Dublin, Ireland During 1996.**

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## Executive Summary

O'Higgins (1996) in her review of treated drug misuse in Dublin found that the numbers in treatment rose by almost a thousand from 2,037 in 1990 to 2,919 in 1994. O'Higgins states that this expansion in numbers may reflect a development of the services provision for drug misusers but also may reflect an increase in the numbers involved in drug misuse. Indeed Comiskey et al (1992) in a study of the transmission of HIV and AIDS amongst Irish intravenous drug users estimated that approximately 7,500 people were using drugs intravenously. Based on the range of estimates in these earlier studies we see that there is a clear and urgent need to address the uncertainty in the prevalence estimates of drug misuse in Dublin. Opiate user here is defined in a broad context to cover both problematic and non problematic user. Since opiates are known to be the main drugs of use we implement the capture-recapture method, including log-linear modelling to estimate the prevalence of opiate use in Dublin. Anonymous identification data from three sources are used to obtain population samples. Using data on location of residence, prevalence is estimated for different locations of the city. In addition an age based prevalence estimate of male and female opiate drug users is provided.

Results of prevalence estimates ranged from over 6,000 among medical data sources up to approximately 14,000 among the three data sources therefore it would seem prudent for planning purposes to assume that in Dublin in 1996 there were approximately 10,500 -12,500 opiate users. Not all of these may seek or be in need of treatment, looking at results derived from medical data alone it would appear that approximately 6,000 - 7,000 may require treatment. It should also be remembered that the majority of these users were found to be male and within the 15-24 year age range.

To be specific a population of 13,460 opiate drug users in Dublin in 1996 between the ages of 15 and 54 inclusive was estimated from the three data sources. This corresponds to an estimated prevalence of 21/1000 or 2.1% of the population. The number of users within this age identified through the raw data alone was found to be 6,264, corresponding to a known prevalence rate of 10/1000 or 1% of the population. The estimated prevalence agrees with basic estimates derived using 2 sample capture recapture methods (6,182 estimated from the two medical data sources, methadone and HIPE, 14,626 estimated from police and methadone data sources and 11,553 estimated from police and HIPE data sources).

On a European comparison this estimate is in accordance with estimates published by other European cities.

## **Main Findings and Recommendations**

### **Findings**

- No previous pooling of data has occurred. It was found from the collation of the three raw data sources alone that there were a minimum of 6,449 individual opiate users in Dublin in 1996.
- Using only the two medical data sources it was estimated that there were 6,182 opiate users in Dublin in 1996. This provides us with an estimate of the numbers that may be seeking treatment.
- Using all three data sources it was estimated that there were 13,460 opiate users (95% C.I. of 10,665 - 14,804) in Dublin in 1996.
- It was found that there was very little overlap between the police and medical data sources- This would indicate that these organisations are dealing with different subgroups of the same population.
- The most hidden group (i.e. the group coming into contact with the services least) was found to males aged between 35 and 54. The most visible group was males aged between 25 and 34. The same phenomena was found amongst females of the same ages.
- Estimated prevalence of opiate use was found to be highest amongst males aged between 15 and 24 years. From the raw data alone 2,469 users were identified and it was estimated that there were 5,404 users in total. This represents a raw data prevalence of 25/1000 and an estimated prevalence of 56/1000.
- Looking at the police and hospital raw data on males aged between 15 and 24 years it was found that certain areas within Dublin had particularly high known prevalence. Dublin 1 - 64/1000, Dublin 7 - 50/1000, Dublin 8 - 107/1000, Dublin 10 - 107/1000, Dublin 12 - 50/1000, Dublin 22 - 50/1000.

### **Recommendations**

- No previous pooling of data has occurred. From the collation of the three data sources it was found that there were 6,449 known opiate users in Dublin in 1996. It is strongly recommended that the combining and pooling of data sources be both continued and widened.
- As Data Protection Commissioner approval was granted for this study it is recommended that the study be updated with 1997 data. This would allow the evaluation of any legal or medical changes which occurred in 1996.
- The wider implications of this present research findings need to be addressed. It is estimated that there were approximately 10,500 - 12,500 opiate users in Dublin in 1996. Smyth et al (1995) estimate that 80% of drug users who have tested for Hepatitis C tested positive. It is recommended that an analysis of the true extent and spread of Hepatitis C be conducted. This also has implications for continuing risk behaviour for the spread of HIV and AIDS.

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*“...the evidence increasing numbers in treatment leads to the question as to whether the increases are artifacts of better reporting and a greater provision of services or is the number of drug misusers in the community actually increasing? Without some estimation of overall prevalence, the answer to that question must remain in the realms of speculation.”*

*O’Higgins (1996).*

## **SECTION 1. INTRODUCTION**

The aim of this study is to address the above issue raised in the concluding paragraph of the Health Research Board Report, *Treated Drug Misuse in the Greater Dublin Area: A Review of five years 1990-1994*.

The objective was to estimate the prevalence of opiate drug use in Dublin in 1996. The capture-recapture method will be implemented with three data sources. These data were drawn from the methadone treatment list, Garda Siochana arrests and hospital discharges. These data were then utilised to derive estimates of hidden drug misuser population. Estimates were based on age, sex and location of residence of drug user.

## **SECTION 2. BACKGROUND AND SIGNIFICANCE**

Despite considerable advances in the provision of health care services to drug users, medical, public health and financial planning continues to be troubled by the uncertainty of the extent of hidden drug misuse. Within the national and international medical and scientific press many questions on the nature and extent of the prevalence of drug misuse have been addressed. Similarly, the popular media of television, radio and press speak of the ‘raging epidemic’, the ‘scale of the drugs haul’ and more recently, ‘people power; pushing out the pushers’.

Johnson et al (1994) in a study of the risk behavior in attendees at a Dublin needle exchange programme speak of the high level of unsafe injecting and sexual activity. The authors point out the need for more effective health promotion among drug users in Dublin. Comiskey (1991) and Comiskey et al (1992) in a 2 year survey of drug users estimated that a total of 375 people enter the drug using population each year with 198 of these being in the Dublin region. O’Higgins (1996) in a five-year review found that the numbers seeking treatment for the first time had almost doubled from 624 in 1990 to 1150 in 1994. In addition the mean age over the five year period was seen to decrease from 25.2 years in 1990 to 23.8 years in 1994. The review also finds that the most commonly used primary drug is heroin with over 82% of those attending treatment citing it as their primary drug of misuse. This is also reflected in the police statistics. Keogh (1997) finds that opiates represent 93% of those arrests where drugs

were noted. While these studies provide a significant and valuable contribution to our understanding of the drug misuse profile in Dublin, they are primarily indicators of the number of drug misusers in the population and there is to date no comprehensive study on the true prevalence of drug misuse in Dublin.

A number of studies of prevalence of drug misuse have been undertaken elsewhere. For instance, Squires et al (1995) using the capture-recapture method in a study of the prevalence of drug misuse in Liverpool in 1991 found a period prevalence of 5.2 per 1000 population with this rising to a prevalence of 16.9 per 1000 population in the 15-29 year age group. In addition they identified that services for drug misusers should be focused on areas of deprivation. Domingo-Salvany et al (1995) again used the capture-recapture method to estimate the prevalence of opiate addiction in the city of Barcelona in 1989. Using three different data sources the authors found a prevalence rate of between 8.5 and 9.9 opiate addicts per 1000 population.

In both of the above studies the authors found that estimates of prevalence were higher than those numbers already known to the health service and police authorities. Estimates of the hidden prevalence of drug misuse obviously provide a valuable aid to the planning and provision of the necessary financial, legal and health care services.

### **SECTION 3. RESEARCH METHODS**

The capture-recapture method is an indirect method that generates a prevalence estimate based on the degree of overlap between two or more separate samples of the population under study. For example when working with three samples or data sets, the first sample provides the individuals for marking or tagging and is returned to the population. The second and third sample provides the recaptures. Using the number of individuals caught in two or three samples and the numbers caught in one sample, it is possible to estimate the number not caught in any of the three samples, thus providing an estimate of the total population size. In addition the method allows the confidence intervals of the population estimate to be calculated. It was originally used in ecological studies to assess the size of animal populations and in human populations to ascertain completion of census data. In epidemiology, different registers of the disease have been used as 'capture' samples, with names or confidential identifiers used to tag unique individuals to assess the overlap between samples.

The assumptions of the model are the following;

1. There is no change to the population during the investigation.
2. There is no loss of tags, individuals can be matched from capture to recapture.
3. For each sample, each individual has the same chance of being included in the sample.
4. The samples are independent.

This capture-recapture method has been applied to epidemiological studies including heroin abuse, injecting drug use prevalence and estimates of the size of the population infected with the human immuno-deficiency virus. A detailed application of the method

may be found in the papers of the International Working Group for Disease Monitoring and Forecasting, (1995, 1995a).

The capture-recapture method for estimating the prevalence of drug misuse has been applied in diverse communities throughout the world. Korf et al (1994) in the Netherlands, Larson et al (1994) in Australia, Abeni et al (1994) in Italy and Mastro et al (1994) in Asia have all employed this method.

We apply the method to estimate the prevalence of opiate use in Dublin. The first stage of implementation of the method involves removing duplicates from the data and identifying which cases were recorded in two or more samples. This may be done using five types of identification available for each sample: 1) date of birth, 2) sex, 3) forename initial, 4) surname initial and 5) postal code. Confidentiality can be maintained throughout the entire process and the identification of all persons remains unknown. Cases may be matched using a sort procedure on a standard statistical package such as SPSS/PC or SAS. Once the number of unique individuals within each sample and the overlap between samples has been determined prevalence estimates may be obtained using the standard formulas and techniques. Finally using the statistical package GLIM log-linear regression models may be fitted to the data to determine possible dependence between samples.

#### **SECTION 4. DESCRIPTION OF THE DATA SOURCES USED IN THE ANALYSIS.**

We applied the capture-recapture methodology to estimate the prevalence of opiate drug users in Dublin in 1996. Three sources of information on drug users living in Dublin were used. Firstly, the Central Patient Methadone Treatment List, secondly, the Hospital Inpatient Enquiry database (known as H.I.P.E.) and thirdly the police (known in Ireland as The Garda Siochana) database for arrests in 1996. Prior to the collation of the data a meeting with the Assistant Data Protection Commissioner was sought and approval for the study was gained.

##### **Section 4.1 Description of the cities population profile.**

Dublin is the capital city of The Republic of Ireland. The 1996 census of the total population of Ireland identified 3,626,087 inhabitants. This represented a 2.8 per cent increase from the previous census in 1991. The population of Dublin city and county was 1,058,714. This represents over 29 per cent of the total population. In addition, of those living in Dublin 430,385 (or 41 per cent) are under the age of 25 years. A detailed age profile of the Dublin population is provided in Table 1 below.

**Table 1**

Age (years)	0 - 14	15 - 24	25 - 34	35 - 44	45 - 54	> 54
Males	120,444	97,222	84,350	69,540	56,682	81,178
Females	112,700	100,009	91,891	75,188	60,447	109,063
Total	233,144	197,231	176,241	144,728	117,129	190,241

Source: Census 1996. Principal Demographic Results. Central Statistics Office.



## **Section 4.2 The Central Patient Methadone Treatment List**

This list is maintained jointly by the Eastern Health Board and the Drug Treatment Centre. It was set up in 1994 and it records those who have ever since 1994 received methadone from either the Eastern Health Board, The Drug Treatment Centre or a general practitioner. Notification of cases by G.P.'s is voluntary and as a result not all patients being prescribed methadone are included on the list. The list therefore represents an underestimate of the numbers of those in receipt of methadone treatment. From the list initials, date of birth and sex of those on methadone in 1996 were provided and entered onto the computer. We found that 3,170 individuals were in receipt of methadone in Dublin in 1996. The number of list at any one time point in 1996 would differ from this as some individuals may be on a longterm maintenance program while others may be on a short detoxification program- The mean age of those receiving methadone in 1996 was found to be 27.24 years, with a standard deviation of 6.87 years. There were 2225 (70.2%) males, 920 (29.0%) females and for 25 (0.8%) clients the sex was unknown.

## **Section 4.3 The Hospital Inpatient Enquiry Database (H.I.P.E.)**

The Economic and Social Research Institute, Dublin, maintains the central HIPE database. This database records all discharges from Irish hospitals and the primary and secondary diagnoses of those patients discharged. Those patients who used opiates were identified from the ICD 9 classification code 304.0, opioid type dependence, code 304.7, combinations of opioid type drug with any other and code 305.5, opioid abuse. As of March 1997 the central HIPE database identified 603 patients in the Dublin area with these codes as a primary or secondary diagnosis. These 603 patients were identified in 12 different Dublin hospitals. However, 92% of these cases were in 4 of the Dublin hospitals. As the central HIPE database does not have access to patients initials it was decided to contact these 4 hospitals individually and seek their permission for access to this data. Permission was granted and initials, date of birth, sex and postal code on 545 opiate drug users was obtained. The four hospitals involved in the study were St. James Hospital, Beaumont Hospital, The Mater Misericordiae Hospital and The Meath and Adelaide Hospital combined. The variables recorded were surname initial, sex, date of birth and Dublin postal code. Of the 545 patients identified, 353 (64.77%) were male and 192 (35.23%) were female.

## **Section 4.4 Police Arrests**

In 1996 the Assistant Garda Commissioner, Mr. T. King commissioned a study on illicit drug use and related criminal activity in the Dublin Metropolitan Area (DMA). After an extensive search of all Garda records held at police station level, a database consisting of 4,105 individuals identified with drug use was constructed. The majority of these were male, unemployed and living at home. Males accounted for 3,467 (84.46%) of cases and females accounted for 638 (15.54%) of cases. 80% were in the 15 to 30 year age group, with the youngest user being 12 years and the eldest being 60 years. The principal drugs used were opiates (heroin and methadone) with 3,817

(93%) users identified. Not all of those arrested were arrested under The Misuse of Drugs Act. Most were arrested for other crimes, for example shop lifting and while in custody they asked to see a medical doctor so that methadone could be prescribed. In some cases those arrested were found with needle marks on their body. A list of seven reasons why drug users were known to the police is provided in Table 2 below.

**Table 2**

Drug User Identified By:	Number of Users	%
Possession	407	10
Admits	2098	51
Treatment	151	4
Paraphernalia	501	12
Physical Signs	285	7
Custody Methadone	473	12
Other	190	5
Total	4105	100

Source: Keogh (1997)

It should be noted at this stage that the capture recapture analysis was carried out on the police data set as described above and on an edited data set with the data on possessions and admissions deleted. The edited data set gave similar results to the full data set and it was decided therefore to include all the data in the analysis.

## **SECTION 5. OTHER INFORMATION ABOUT THE ANALYSIS.**

To remove duplicates within the three data sources different procedures were used. For the Central Patient Methadone Treatment List individuals appearing on the list more than once were identified from their first name initial, surname initial and date of birth. Data supplied from the HIPE database was provided with duplicates removed. Data from the police arrests also had the duplicates removed but included some drug users who were living outside the Dublin area. These were easily removed after a visual inspection of the data.

The variables that were common to all three of the data sources were surname initial, date of birth and sex. In order to identify overlaps between sources these variables were used. For example if C 16/11/1962 Female was observed in say the methadone treatment list and the HIPE database men it was assumed that this was the same person and an overlap was noted.

Finally of the 4,105 cases noted in the police data, Keogh (1997) states that 3,817 (93%) were opiate drug users and 288 (7%) were non opiate users. The column of data on type of drug used was not supplied hence we were unable to remove these non opiate users from the data set.

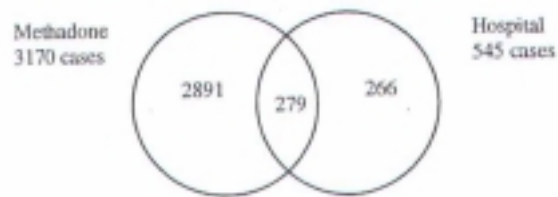
## SECTION 6. RESULTS

In order to obtain a valid prevalence estimate of opiate drug use we adopted several approaches to the data. Firstly, estimates were obtained by using different combinations of two of the three data sources- Secondly, estimates were obtained using all three data sources together, all three sources stratified by gender and all three sources stratified by age and gender. Finally estimates based on location of residence were obtained for the group where opiate use was seen to be most prevalent, males 15 to 24 years old.

### Section 6.1 Prevalence Estimates From Two Samples

In this section estimates of opiate drug misuse prevalence based on capture recapture methods for two data sources and Baileys (1952) improved capture recapture formula are provided. The 2 medical data sources are explored first. From figure 1 below it can be seen that a total of 3,715 cases were identified. As 279 individuals were on both the 1996 methadone treatment list and the hospital database, 3,436 unique individuals were identified from these two data sources.

Figure 1. Methadone and Hospital Data

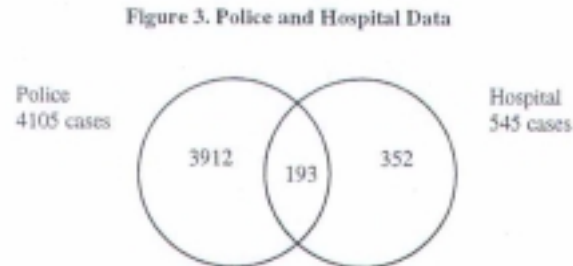


Looking at the overlap between the methadone and police arrest data we note that 7,275 cases are identified with an overlap of 889 individuals appearing in both data sets. This gives us a total of 6,386 unique individuals identified from these two data sources alone. This is illustrated in figure 2 below.

Figure 2. Methadone and Police Data



Finally looking at the police arrest data and hospital data we note that 4,650 cases were identified with 193 individuals appearing in both data sets giving a total of 4,457 unique individuals identified through these two data sources. This is illustrated in figure 3 below.



It is interesting to note at this stage how little overlap there is between data sources. This will have a considerable effect on prevalence estimates results. The smaller the overlap between data sources the higher the estimate of prevalence. This is illustrated in the table of two sample results below. Only 28.4% of those on the methadone treatment list are also in the police arrests data base. Similarly only 35.4% of those appearing on the hospital data base are appearing on the police arrests data base. This would appear to indicate that the medical and legal organisations are encountering different sub groups of the opiate drug using population. This phenomenon will have to be taken into consideration when interpreting prevalence results derived from the different data sources. Two sample capture recapture prevalence estimates along with their corresponding confidence intervals are provided in Table 3 below.

**Table 3.  
Two sample capture recapture prevalence estimates of opiate use in Dublin 1996.**

Data Sources	Known Number	Estimated Hidden Number	Ratio of Known to Hidden	Estimated Total	95% C.I. for the total estimate	Estimated Prevalence per 1000 of population aged 15-54 years
Methadone and Hospital Data	3,436	2,746	1:0.80	6,182 (5,795)	5,668 - 6,696	9.73/1000
Methadone and Police Data	6,386	8,240	1:1.29	14,626 (13,560)	13,794 - 15,458	23.02/1000
Police and Hospital Data	4,457	7,096	1:1.59	11,553 (10,750)	10,889 - 12,212	18.18/1000

In the above table estimates of prevalence and confidence intervals are derived from the Bailey (1952) improved formula. Prevalence estimates in brackets are derived using the original Petersen (1896) formula. It is interesting to note the difference in the estimates depending on the combination of data sources chosen. Choosing the two medical data sources leads to a lower prevalence estimate. The individuals appearing in these data sources may perhaps be defined as problematic drug users from a medical point of view. Thus the prevalence estimate may be thought of as the number that may require medical treatment in the future. Numerous authors have established that using similar data sources i.e all medical or all legal will provide a lower prevalence estimate.

Estimates derived from the more disparate data sources are considerably higher and are perhaps closer to the actual number of opiate drug users within the population. It would be misguided to assume that all these users will be seeking treatment. By using disparate data sources we have in fact broadened our definition to include all opiate users both problematic and non problematic.

In order to provide an overall prevalence estimate from each of the 3 combinations of two data sources we average over the population prevalence estimates to arrive at an estimate of 16.18/1000 or 10,280 opiate drug users in Dublin in 1996 between the ages of 15 and 54 years. This result will be discussed further following the three sample and location of residence prevalence estimates.

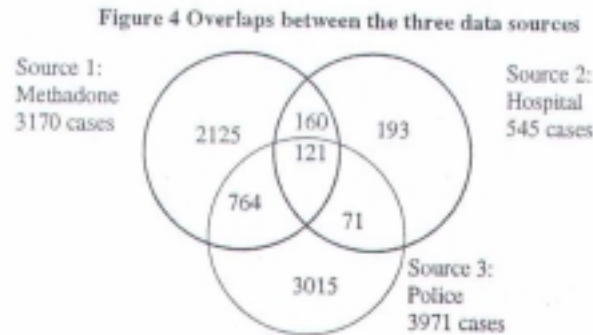
## Section 6.2 Prevalence Estimates From Three Samples

In this section prevalence estimates based on the three data sources are provided and the best estimates are computed following a sex and age stratification of the three data sets. A summary of the number of contacts within each age group and within each data source is provided in Table 4 below. Note that in this analysis 134 cases were removed from the police data as these did not have a known Dublin postal code.

**Table 4**  
**1996 Data Sources By Sex and Age**

	Male	Male	Male	Female	Female	Female
Age in years	15-24	25-34	35-54	15-24	25-34	35-54
Source 1: Methadone List	925	986	338	450	375	95
Source 2: HIPE Database	133	165	55	99	73	20
Source 3: Police Arrests	1820	1164	218	371	179	35
Total Contacts	2878	2315	611	920	627	150
Individuals	2469	1874	534	755	506	126

Figure 4 and Table 5 below illustrate and summarise the overlaps between each source for all age groups.



**Table 5**

**Data from the 3 samples illustrating the overlaps between data sources.**  
**(Includes those outside the 15-54 year age range or where age was unknown.)**

		Source 1			
		Present		Absent	
		Source 2			
		Present	Absent	Present	Absent
Source 3	Present	121	764	71	3015
	Absent	160	2125	193	*

From Table 5 above and Table 6 below it can be seen that a total of 6,449 individual opiate users were identified from the three data sources and that 6,264 of these were within the 15-54 year age range. It is also interesting to note that of the 185 outside the age range 184 were identified within data source 3, the police arrests. In many of these cases the age of the individual was unknown. The numbers in Tables 5 and 6 do however provide us with a minimum estimate of the prevalence of opiate drug use in Dublin in 1996.

**Table 6**

**Data from the 3 samples illustrating the overlaps between data sources.**  
**(Note this includes only those users within the 15-54 year age range )**

		Source 1			
		Present		Absent	
		Source 2			
		Present	Absent	Present	Absent
Source 3	Present	121	764	71	2831
	Absent	160	2125	193	*

Using the methods of Bishop, Fienberg and Holland (1995) and the statistical modelling package GLIM together with macros devised by Cormack, Comiskey and Hay, loglinear models for capture recapture studies were fitted. The following results were obtained:

**Table 6a**  
**Prevalence estimates for the hidden population of opiate drug users**  
**in Dublin in 1996 within the 15-54 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	225.54	3	0.00	6074	5599 - 6581
+S1xS2	32.64	2	0.00	7335	6726 - 7993
+S1xS3	155.37	2	0.00	3135	2603 - 3741
+S2xS3	219.52	2	0.00	6291	5771 - 6849
+S1xS2+S1xS3	32.52	1	0.00	7696	5844 - 10150
+S1xS2+S2xS3	15.73	1	0.00	7870	7168 - 8636
+S1xS3+S2xS3	145.81	1	0.00	2562	2052 - 3171
Saturated	0.00	0	1.00	16180	11117 - 23423

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.

From Table 6a. above it is evident that the data does not fit the models well and hence does not provide us with an estimate of prevalence. To overcome this problem the data was stratified by gender and by age and gender.

### **Section 6.3 Prevalence By Gender and By Age and Gender**

The data was stratified on the basis of gender and the analysis run. It is evident from the results in Tables A1 to A4 in the appendix that further stratification is required. Analysing the data by age and gender does however provide some reliable prevalence estimates. The details of the data and results of these analyses are also provided in the appendix.

From Tables A5 to A16 in the appendix it can be seen that that the models in 2 of the 6 stratifications did not fit well and reliable estimates can only be provided for 4 of the groupings. In Table 7 below a summary of the estimates obtained is provided. Included the known numbers of cases, the estimated hidden population, the overall estimate and 95% confidence intervals for these estimates.

**Table 7**  
**Estimated prevalence of opiate use in specific populations in Dublin in 1996**

	Known Number	Estimated Hidden Number	Ratio of Known To Hidden	Estimated Total	95% C.I. for the total estimate	Known Prevalence per 1000 population	Estimated Prevalence per 1000 population
Male 15-24	2469	2935	1 : 1.19	5404	4980 - 5891	25	56
Male 25-34*	1874	1638	1 : 0.87	3512	1904 - 3276	22	42
Male 35-54	534	893	1 : 1.67	1427	1175 - 1773	4	11
Female 15-24*	755	1023	1 : 1.35	1778	1525 - 2108	8	18
Female 25-34	506	533	1 : 1.05	1039	875 - 1265	6	11
Female 35-54	126	174	1 : 1.38	300	206 - 491	1	2
Total	6264	7196	1 : 1.15	13,460	10665 - 14804	10	21

\* Indicates a poor fitting model and hence an unreliable estimate.

It is evident from the raw data prevalence and estimated prevalence in Table 7 above that males in the 15 - 24 age group represent the single largest group of opiate users. Pooling the three raw data sources we see that prevalence in this group is 25 per 1000 of population or alternatively it may be stated that a minimum of 2.5% of all males in this age group are known to be using opiates.

Looking at the ratio of known population to hidden population we see that males between 35 and 54 years are the most hidden group, we may interpret this as the group least likely to come into contact with the medical or legal services. Those most likely to come into contact with services, that is, the most visible or accessible group we see are males between the ages of 25 and 34. With females the same phenomena is seen within the same age groups.

#### **Section 6.4 Prevalence By Location of Residence (Males 15-24 years only)**

From Table 7 above it is noted that males in the 15-24 year age group exhibit both the highest known and estimated prevalence. In order to explain this it was decided to examine the prevalence within this group further. Additional information on residential postal code was available for this group within the hospital and police arrest data. A multisource enumeration of prevalence based on these two raw data sources and capture recapture prevalence estimates (computed where possible) are provided in Table 8 below.



**Table 8.**  
**Minimum prevalence estimates of opiate use among males aged 15-24 by**  
**location of residence.**

Postal Code	Cases Identified	Population (1996 Census)	Minimum Prevalence - Multisource Enumeration	Estimated Prevalence - Capture Recapture **
Dublin 1	183	2880	63.5/1000	148.6/1000
Dublin 2	52	1941	26.8/1000	
Dublin 3	24	2479	9.7/1000	
Dublin 4	34	2612	13/1000	
Dublin 5	77	4379	17.6/1000	
Dublin 6	15	6603	2.3/1000	
Dublin 7	177	3557	49.8/1000	
Dublin 8	293	2738	107/1000	175.7/1000
Dublin 9	20	5709	3.5/1000	
Dublin 10	92	2738	107/1000	
Dublin 11	151	5823	25.9/1000	48.4/1000
Dublin 12	98	1964	49.9/1000	
Dublin 13	10	1335	7.5/1000	
Dublin 14	44	3909	11.3/1000	
Dublin 15	115	4804	23.9/1000	
Dublin 16	19	5145	3.7/1000	
Dublin 17	37	1712	21.6/1000	
Dublin 18	1	2132	0.5/100	
Dublin 20	3	1293	2.3/1000	
Dublin 22	195	3885	50.2/1000	
Dublin 24	217	8241	26.3/1000	
Total	1857	75879	24.5/1000	

\*\* Estimated where overlaps were sufficient

It is evident from Table 8 above that certain areas have high known prevalence of opiate use amongst males aged 15 to 54. Dublin 1, 7, 8, 10, 12 and 22 all have rates of 50/1000 or over, that is to say that a minimum of 5% of males aged between 15 and 24 years and living in these areas are using opiates. These figures are based on police arrests and hospital discharges only. If information on location of residence was available for the methadone data it would be interesting to see how these additional data would affect known prevalence.

## **SECTION 7. SUMMARY AND DISCUSSION OF RESULTS**

In spite of the poor performance of the early models fitted to the total population in Table 6a and to the gender specific populations, very useful results were derived by stratifying the data by both age and gender as can be seen from the summary of results in Table 7 above. If we sum over the population prevalence estimates we arrive at an

estimate of 13,460 opiate drug users in Dublin between the ages of 15 and 54 inclusive. This corresponds to an estimated prevalence of 21/1000. The number identified through the raw data alone we see from Table 7 above is 6,264, corresponding to a known prevalence rate of approximately 10/1000 of population. The estimated prevalence of 13,460 broadly agrees with the crude average estimate of 10,280 derived from the 2 sample results where individual results gave 6,182 estimated from the two medical data sources, methadone and HIPE, 14,626 estimated from police and methadone data sources and 11,553 estimated from police and HIPE data sources.

In the light of prevalence estimates ranging from over 6,000 among medical data sources up to approximately 14,000 among the three data sources it would seem prudent for planning purposes to assume that in Dublin in 1996 there were approximately 10,500 -12,500 opiate users. Opiate user here is defined in a broad context to cover both problematic and non problematic user. It should also be remembered that the majority of these users are male and within the 15-24 year age bracket and we can see from Table 8 above that these users are concentrated within certain areas of the city.

On a European comparison this estimate is in accordance with estimates published by other European cities. In Barcelona, Domingo-Salvany et al (1995) estimate an opiate drug user population prevalence of 9.2/1000, Frischer (1992) estimates the prevalence of injecting drug use in Glasgow to be 13.5/1000 with this rising to 43.45/1000 in males aged between 20 to 24 years. High prevalence amongst young males is noted in our study also, as can be seen from Table 7 where a prevalence rate of 56/1000 is estimated for males aged 15-24 years. In a similar study in Setubal, Portugal prevalence of opiate use among males aged 15-24 years was estimated to be 53/1000 (private communication). Finally in Dundee, Scotland, Hay and McKeganey (1996) estimated the prevalence of opiate use to be 30/1000.

A recent pilot study on implementing the capture recapture method to estimate prevalence of opiate use was commissioned by The European Monitoring Centre for Drugs and Drug Addiction. The study involved six cities including Dublin. A comparison of some of the results from other cities is provided in Table 9 below.

**Table 9**  
**Comparison of prevalence estimates from other studies on opiate use.**

<b>City</b>	<b>Year</b>	<b>Prevalenc</b>
Rome, 3 sample capture recapture study.	1996	8.6/1000
Setubal, 3 sample capture recapture study.	1996	18.2/100
Barcelona, 3 sample capture recapture study.	1995	9.2/1000
Glasgow, 3 sample capture recapture study on infecting drug use only.	1992	13.5/1000
Dundee, 3 sample capture recapture study.	1996	30/1000
Dublin, 3 sample capture recapture study, see	1996	21/1000

Table 7 for details		
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**SECTION 8. RECOMMENDATIONS FOR FUTURE RESEARCH.**

As methods of analysis, collaborative contacts and data protection commissioner approval have already been granted it would be a straight forward matter to update this study with 1997 data. At present a further drug prevalence study is being funded by Forbairt and that study is being conducted by the author. The same three data sources could be used. The H.I.P.E. data and methadone treatment data for 1997 should be readily available. However the police arrest data for 1997 is not to the authors knowledge being collated at present. We propose that the researcher who is currently working on the Forbairt study assist with this collation of 1997 police data. Results from a further study of prevalence for 1997 would provide essential information to the Departments of Health and Justice. It would increase knowledge on the extent of drug misuse, the effect of changes in legislation in late 1996 and the further extension of treatment services. A further study would allow the evaluation of any changes which occurred.

The wider implications of the findings in the present study need to be addressed. For instance we know that 80% of those drug users tested for Hepatitis C were found to be Hep C sero positive. Analysis of the extent and spread of prevalence of Hep C amongst the hidden group of drug users is essential for planning and provision of medical and social services for those affected.

Other aspects of the findings are confirmation of known areas of high prevalence; age and gender of drug users and previously unavailable data on numbers involved.

Finally no previous pooling of data occurred and it is now established that from the three data sources alone there are 6,449 known opiate drug users and approximately twice this number in total. It is strongly recommended the combining and pooling of data sources be both continued and widened.

## SECTION 9. REFERENCES

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## Appendix

Tables A1, A2, A3 and A4 below provide an analysis of the data by gender.

**Table A 1-Males**

**Data from the 3 samples illustrating the overlaps between data sources for males.**  
**(Note this includes only those users within the-15-54 year age range )**

		Source 1			
		Present		Absent	
		Source 2			
Source 3		Present	Absent	Present	Absent
	Present	79	621	54	2448
	Absent	94	1455	126	*

**Table A2 – Males**

**Prevalence estimates for the hidden population of male opiate drug users  
in Dublin in 1996 within the 15-54 year age range.**

Model	$G^1$	d.f.	p value	N	95% CI
Independence	139.34	3	0.00	4680	4259 -
+S1xS2	17.52	2	0.00	5438	4926 -
+S1xS3	100.17	2	0.00	2511	1993 -
+S2xS3	136.21	2	0.00	4816	4360 -
+S1xS2+S1xS3	17.42	1	0.00	5712	4135 -
+S1xS2+S2xS3	9.26	1	0.00	5736	5160 -
+S1xS3+S2xS3	92.07	1	0.00	1950	1470 -
Saturated	0.00	0	1.00	11248	7127 -

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.

**Table A3 - Females**

**Data from the 3 samples illustrating the overlaps between sources for females.**  
**(Note this includes only those users within the 15-54 year age range )**

		Source 1			
		Present		Absent	
		Source 2			
Source 3		Present	Absent	Present	Absent
	Present	42	143	17	383
	Absent	66	669	67	*

**Table A4 - Females**

**Prevalence estimates for the hidden population of female opiate drug users in Dublin in 1996 within the 15-54 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	65,82	3	0.00	1150	967 - 1359
+S1xS2	23.29	2	0.00	1521	1253 - 1836
+S1xS3	44.16	2	0.00	640	461 - 863
+S2xS3	58.61	2	0.00	1245	1036 - 1486
+S1xS2+S1xS3	23.29	1	0.00	1509	879 - 2630
+S1xS2+S2xS3	7.94	1	0.00	1792	1447 - 2212
+S1xS3+S2xS3	43.70	1	0.00	679	468 - 958
Saturated	0.00	0	1.00	4494	2240 - 9010

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.

Tables A5 to A 16 below provide a breakdown of the data by age within gender together with the results from the models fitted.

**Table A5 – Males**

**Males aged 15-24 Years**

**Data from the 3 samples illustrating the overlaps between data sources.**

		Source 1		Source 2	
		Present	Absent	Present	Absent
Source 3	Present	29	288	28	1475
	Absent	35	573	41	*

**Table A6 - Males**

**Prevalence estimates for the hidden population of male opiate drug users in Dublin in 1996 within the 15-24 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	68.06	3	0.00	2428	2109 - 2786
+S1xS2	4.69	2	0.10	2775	2397 - 3204
+S1xS3	42.43	2	0.00	1041	696 - 1485
+S2xS3	65.98	2	0.00	2513	2166 - 2907
+S1xS2+S1xS3	3.58	1	0.06	2160	1311 - 3485
+S1xS2+S2xS3	0.30	1	0.58	2935	2511 - 3422
+S1xS3+S2xS3	34.54	1	0.00	671	411 - 1048
Saturated	0.00	0	1.00	3561	1701 - 7072

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.

**Table A7 – Males**  
**Males aged 25-34 Years**  
**Data from the 3 samples illustrating the overlaps between data sources.**

		Source 1			
		Present		Absent	
		Source 2			
Source 3		Present	Absent	Present	Absent
	Present	43	287	22	812
	Absent	46	610	54	*

**Table A8 - Males**  
**Prevalence estimates for the hidden population of male opiate drug users**  
**in Dublin in 1996 within the 25 - 34 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	56.64	3	0.00	1402	1208 - 1618
+S1xS2	9.89	2	0.01	1638	1402 - 1904
+S1xS3	44.09	2	0.00	831	582 - 1144
+S2xS3	55.41	2	0.00	1441	1232 - 1675
+S1xS2+S1xS3	9.22	1	0.00	1993	1201 - 3305
+S1xS2+S2xS3	6.52	1	0.01	1726	1463 - 2028
+S1xS3+S2xS3	42.62	1	0.00	716	467 - 1062
Saturated	0.00	0	1.00	3960	2002 - 7670

**Table A9 – Males**  
**Males aged 35-54 Years**  
**Data from the 3 samples illustrating the overlaps between data sources.**

		Source 1			
		Present		Absent	
		Source 2			
Source 3		Present	Absent	Present	Absent
	Present	7	46	4	161
	Absent	13	272	31	*

**Table A10 – Males**

**Prevalence estimates for the hidden population of male opiate drug users in Dublin in 1996 within the 35- 54 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	9.13	3	0.03	780	579 - 1045
+S1xS2	5.31	2	0.07	893	641 - 1239
+S1xS3	8.17	2	0.02	619	350 - 1058
+S2xS3	8.63	2	0.01	808	589 - 1101
+S1xS2+S1xS3	4.84	1	0.03	1248	464 - 4050
+S1xS2+S2xS3	4.27	1	0.04	952	667 - 1359
+S1xS3+S2xS3	8.11	1	0.00	649	330 - 1267
Saturated	.000	0	1.00	3973	923 - 17755

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.

**Table A 11 - Females  
Females aged 15-24 Years**

**Data from the 3 samples illustrating the overlaps between data sources.**

		Source 1		Source 2	
		Present	Absent	Present	Absent
Source 3	Present	24	80	12	255
	Absent	25	321	38	*

**Table A 12-Females**

**Prevalence estimates for the hidden population of female opiate drug users in Dublin in 1996 within the 15-24 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	35.92	3	0.00	680	538 - 849
+S1xS2	17.90	2	0.00	844	654 - 1081
+S1xS3	27.49	2	0.00	409	260 - 611
+S2xS3	29.42	2	0.00	759	592 - 965
+S1xS2+S1xS3	17.88	1	0.00	808	414 - 1589
+S1xS2+S2xS3	6.77	1	0.01	1023	770 - 1353
+S1xS3+S2xS3	26.07	1	0.00	488	282 - 814
Saturated	0.00	0	1.00	3110	1245 - 7710

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.



**Table A 13-Females**  
**Females aged 25-34 Years**  
**Data from the 3 samples illustrating the overlaps between data sources.**

		Source 1			
		Present		Absent	
		Source 2			
Source 3		Present	Absent	Present	Absent
	Present	15	54	5	105
	Absent	32	274	21	*

**Table A 14 – Females**  
**Prevalence estimates for the hidden population of female opiate drug users**  
**in Dublin in 1996 within the 25-34 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	22.12	3	0.00	335	247 - 443
+S1xS2	5.79	2	0.06	464	330 - 640
+S1xS3	12.47	2	0.00	175	95 - 286
+S2xS3	20.29	2	0.00	355	259 - 477
+S1xS2+S1xS3	5.78	1	0.02	441	162 - 1250
+S1xS2+S2xS3	1.40	1	0.24	533	369 - 759
+S1xS3+S2xS3	12.41	1	0.00	180	94 - 308
Saturated	0.00	0	1.00	1049	300 - 3605

S1 = Source 1, methadone; S2 == Source 2, hospital; S3 = Source 3, police.

**Table A 15 – Females**  
**Females aged 35-54 Years**  
**Data from the 3 samples illustrating the overlaps between data sources.**

		Source 1			
		Present		Absent	
		Source 2			
Source 3		Present	Absent	Present	Absent
	Present	3	9	0	23
	Absent	9	74	8	*

**Table A 16 – Females**

**Prevalence estimates for the hidden population of female opiate drug users in Dublin in 1996 within the 35-54 year age range.**

Model	$G^2$	d.f.	p value	N	95% CI
Independence	8.62	3	0.03	109	57 - 194
+S1xS2	3.67	2	0.12	174	80 - 365
+S1xS3	7.12	2	0.03	71	22 - 167
+S2xS3	8.62	2	0.01	109	55 - 199
+S1xS2+S1xS3	****	1	***	****	*****
+S1xS2+S2xS3	3.41	1	0.06	189	81 -432
+S1xS3+S2xS3	6.98	1	0.01	66	19- 167
Saturated	****	0	***	****	*****

S1 = Source 1, methadone; S2 = Source 2, hospital; S3 = Source 3, police.