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OBSERVATOIRE FRANÇAIS DES DROGUES ET DES TOXICOMANIES

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ESTIMATING THE PREVALENCE OF DRUG MISUSE USING CAPTURE-RECAPTURE IN SIX FRENCH CITIES

Introduction

Accurate, timely and comparable estimates of the prevalence of problematic drug use at the local level are important for decision makers and practitioners. However, because a proportion of the drug using population is not in contact with services at any point or period of time, the prevalence of drug misuse need to be estimated with indirect methods. This study sought to apply three-sample capture-recapture methods in order to provide simultaneous estimates of prevalence of problem drug use in six French urban areas.

Material and methods

Data sources

Data was collected from different sources in each city during a six-month period between 2005 and 2006. These included Drug Treatment agencies (DT), Low Threshold agencies (LT), General Practitioners (GP), Hospitals units (H) such as infectious diseases, attendees at accident and emergency, Drug Squads (DS), users referred Treatment by the Court (TC), Treatment units in Prisons (TP), or data detained by the Central Office for the repression of drug-related offences in drug misuse (CO). These data sources were combined within each city in order to get three samples as shown in Table 1.

Table 1 - City, data sources, samples and number of records

City	Sample A			Sample B			Sample C		
		Number of records (%)			Number of records (%)			Number of records (%)	
Lille	DT + H + GP	1,212	(67 %)	LT	327	(18 %)	CO + DS + TP	276	(15 %)
Marseille	DT	565	(61 %)	LT + H	269	(29 %)	CO	95	(10 %)
Metz	DT	140	(28 %)	H	156	(31 %)	CO + DS + TP + LT + TC	206	(41 %)
Rennes	DT	161	(39 %)	LT	130	(32 %)	CO + TP + GP	118	(29 %)
Toulouse	DT + LT	647	(56 %)	GP	424	(37 %)	CO	80	(7 %)
Lyon	DT	645	(47 %)	GP	281	(21 %)	CO + LT + DS + TC + TP	437	(32 %)

Source: NEMO, OFDT, 2007

Problem drug users were included if

- They were resident for more than three months within one of the following urban areas: Lille, Lyon, Marseille, Metz, Rennes and Toulouse.
- They mentioned an illicit drug use during the last 30 days (cannabis excluded): opiates, cocaine/crack, other stimulants and/or hallucinogens (LSD, Ketamine…)
- They were aged 15-64

Capture-recapture method, selection of the best log-linear model and estimate of the confidence interval

- C-RC methods estimate the number of drug users by combining data from Sample A, Sample B, and Sample C, that include drug users and analyse the overlap between them.
- Data sources were matched using the initial of their first name, the first three letters of their surname, sex, and date of birth in order to identify subjects on only one, two or three data sources.
- Log linear models were fitted to the observed data which tested different interactions between the data sources representing potential dependencies. All possible models were run from independent to all two-way interactions representing potential dependencies between two of the data samples.
- The absolute goodness of fit (G^2, the deviance between observed and expected values) of the model was approximated by the chi-squared distribution.
- Models with different degrees of freedom were compared using a log-likelihood ratio test. For models with the same number of interactions, the Akaike Information Criterion (AIC) was used.
- Confidence intervals were estimated following the goodness of fit and using the bootstrap methods.

Results

Table 2 shows the selected log-linear models fitted to the data with the goodness-of-fit and AIC, estimates of the number and prevalence of problem drug users among the general population aged 15-64 in the six study areas.

Table 2 - Selected log linear models, test of best fit, estimates of "unobserved" problem drug users in the six cities and prevalence rates among the population aged 15-64

City	Interaction	DF	G^2	AIC	N. obs	Estimate of unobs	Overall estimate*	95 % CI		Prevalence**	95 % CI	
Lille	AB, C	2	3.20	-0.80	1,683	6,207	7,900	6,300	10,200	10.8	8.7	14.0
Marseille	A, B, C	3	3.98	-2.02	799	4,757	5,600	4,200	7,700	10.2	7.7	14.2
Metz	A, B, C	3	4.48	-1.52	467	1,844	2,300	1,700	3,200	10.8	8.2	15.0
Rennes	AB, C	2	0.76	-3.24	351	1,142	1,500	1,100	2,200	7.6	5.4	11.6
Toulouse	AC, B	2	1.92	-2.08	1,090	4,288	5,400	4,300	6,900	10.1	8.1	12.9
Lyon	AC, B	2	1.54	-2.46	1,267	7,163	8,400	6,300	11,700	10.7	8.0	14.8

** Rounded to nearest 100*
*** Per mille*
Notes: DF (Degrees of Freedom); G^2 (Deviance); CI (Confidence Interval); AIC (Akaike Information Criterion); AB (interaction between sample A and sample B)
Source: NEMO, OFDT, 2007

Discussion

- *Closure assumption:* data is examined over a six-month period and a selection criterion is to be resident for more than three months within the urban area: we must therefore hope that the population size is not too greatly affected by migrations.
- *Perfect identification assumption:* given the abbreviated data on the subjects, there is potential for under- or over-matching which would lead to overestimates or underestimates of the population. The unobserved population of drug users in Marseille and Metz may be over-estimated because of the potential for under-matching suspected with the small overlap. On the contrary, the population size of drug users in Rennes could be underestimated because the level of overlap between data sources is relatively high.
- *Independency assumption*: the use of log linear models allows testing and adjusting for "dependencies" between two data sources with a weaker assumption that there is no three-way interaction.
- *Confidence intervals*: they are generally large in this study because of small overlaps between samples.
- *Prevalence rates:* they are lower here than those observed for other European areas. However, direct comparison is hindered. Except for the urban area of Rennes, prevalence rates are quite similar between the other five French cities. These local estimates are plausible in view of the last capture-recapture study carried out in France in 1999 (E. Chevallier, 2001).

Conclusions

It has been suggested that capture-recapture technique provides the most accurate estimates of prevalence when-compared with other epidemiological counting and has remained one of the most viable methodological alternatives for estimating the local prevalence of problem drug use. Although there are many caveats when using this methodology, this research has produced plausible local estimates of the prevalence of problem drug use in six French cities which are not available in other respect: past local French estimates date from 1999. These new local estimates could be used as anchor points for producing the national estimate of problem drug use prevalence.

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Ref. : Emmanuelle Chevallier, *Estimations locales de la prévelance de l'usage d'opiacés et cocaïne en France*, Paris, OFDT, 2001, 112 p.