Open Problems and Perspectives in Estimating Problem Drug Use Prevalence

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Problem drug use indicator

- The problem drug use indicator aims to provide comparable, scientifically based estimates of the extent of the more severe patterns of drug use that cannot be reliably measured by surveys.

- This information is useful for assessing treatment needs, and offers a realistic basis for estimating the social costs of drug problems, for example drug-related crime.

Problems

- Problems arise with respect to:

- Definition and "case definition"
- Statistical and Mathematical models and methods use for estimation
- Data

Problematic drug use population

- 'Problem drug use' is defined by the EMCDDA as 'injecting drug use or long duration/regular use of opioids, cocaine and/or amphetamines'. This definition specifically includes regular or long-term use of prescribed opioids such as methadone, but does not include their rare or irregular use, nor the use of ecstasy or cannabis.

A fuzzy definition

- It is clear that this definition is not a case definition and that different experts might differently classify the same individual, apart from injectors.

- What's "long term"? What's "regular"? Are they different concepts for different user populations?

- The population of interest might assume different features in different sites and for different drugs.

- Cross country comparability is just mirage.

What's "regular"? Clues from waste water analysis (heroin versus cocaine use)
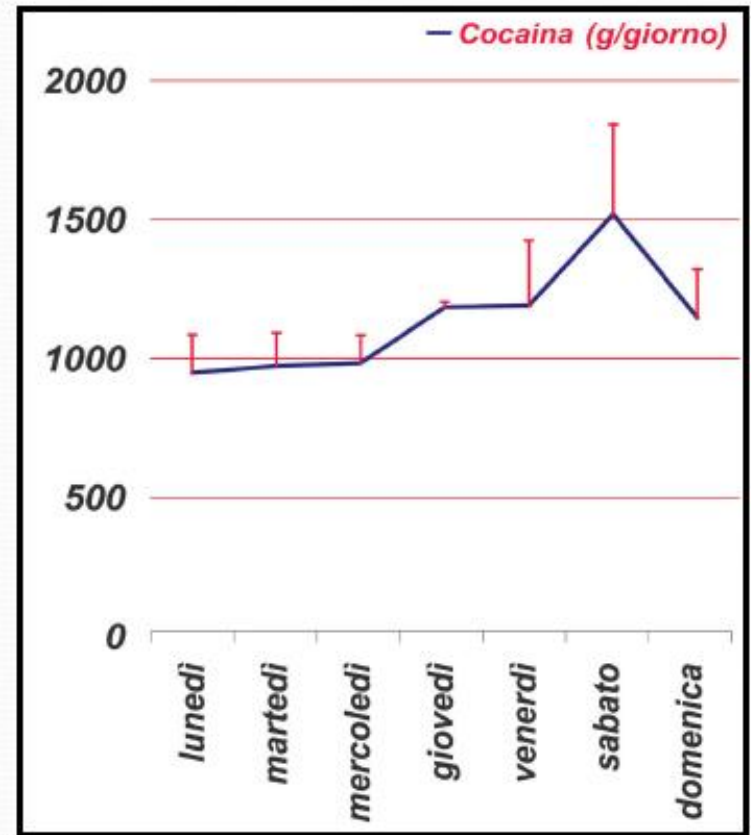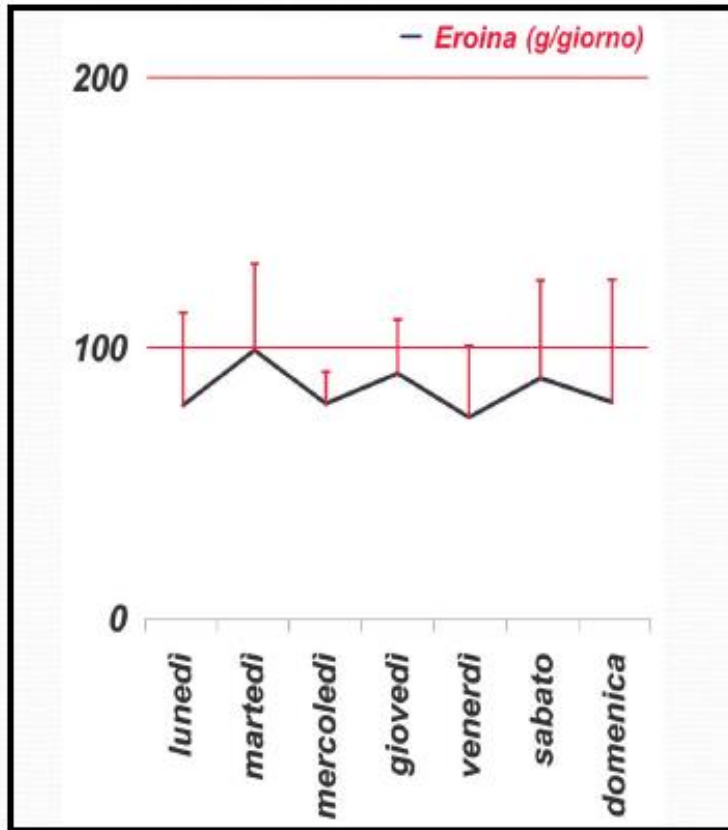
Cannabis
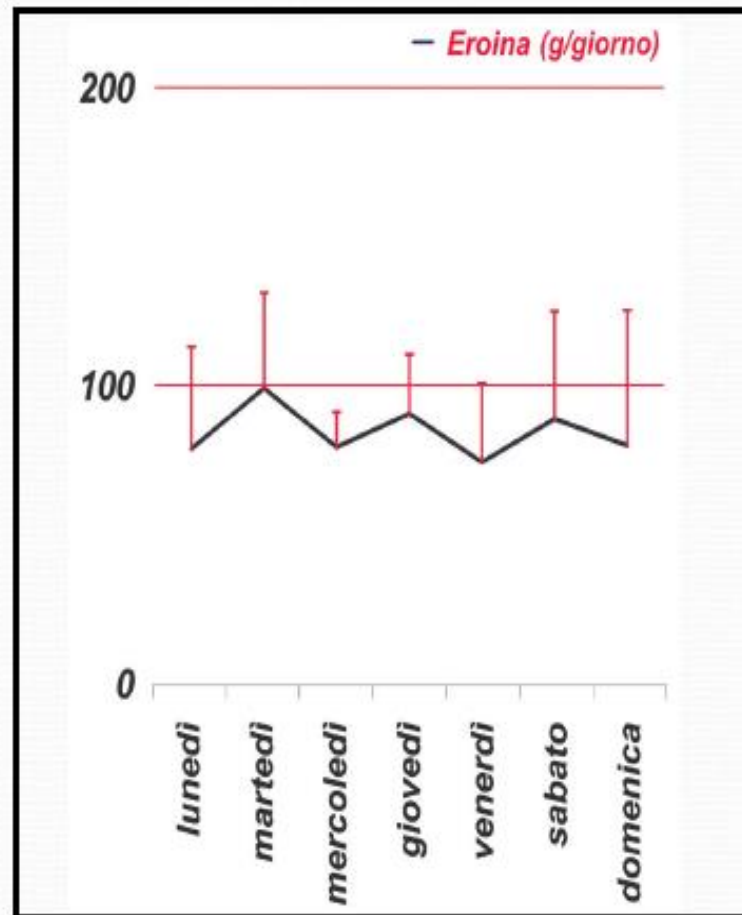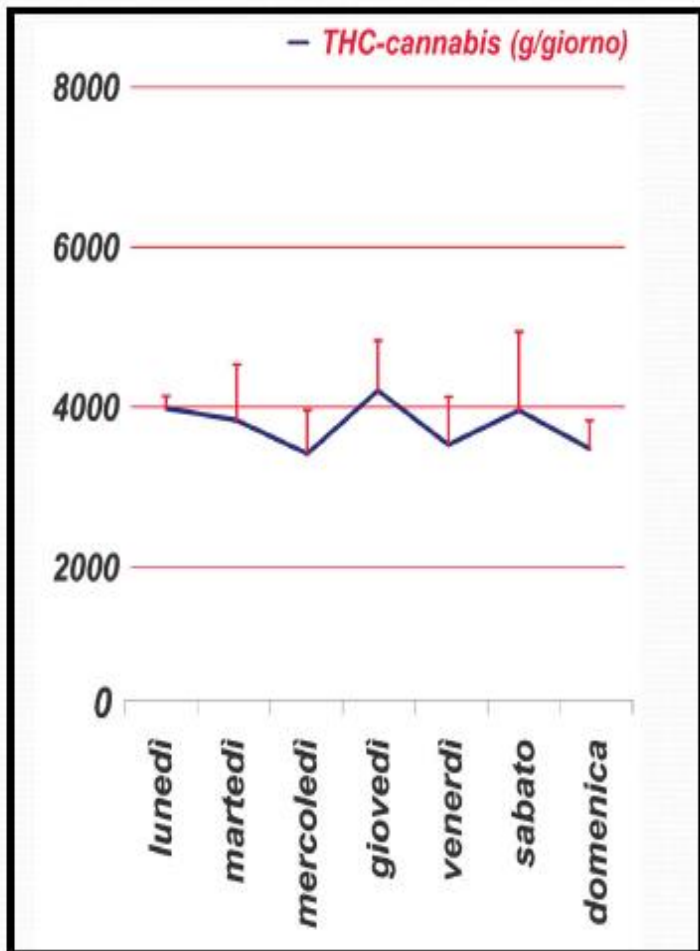
Regular weekly use of cocaine

- Comparing the graphs it seems that "regular use" of cocaine is often a weekly regular use.
- Regular use of heroin and cannabis seems mostly a daily use.
- The behaviours of the 2 curves corresponding to heroin and cannabis, though similar, might correspond to different situations:
- heroin curve likely represents an average dose per daily user,
- cannabis an average dose of a great number of non daily users.

Running after new trends

- As a reaction to a growing stimulants problem, as well as a growing number of cannabis-related treatment demands, the EMCDDA is currently examining the possibilities of breakdowns by main drug, as well as the best way of estimating the population of intensive and/or long-term, possibly dependent or problematic, users of cannabis.

Data and populations

- Breakdowns by main drug do not solve any problem.
- From IPSAD study in Italy (2007-2008) we learn that:

- Among those who consumed cannabis in the last year, 12.7% consumed also cocaine and 3.1% heroin.
- Among those who consumed cocaine in the last year, 84.8% consumed also cannabis and 14.6% heroin.
- Among those who consumed heroin in the last year, 76.8% consumed also cannabis and about 50% cocaine.

Prevalence

- More specifically we can summarize:

Substance	lifetime	last year	last month
cocaine	6.95	2.06	0.72
cannabis	32.02	14.26	6.89
heroin	1.57	0.39	0.15
amphetamines	3.15	0.41	0.14

Prevalence

Substances	lifetime	last year	last month
cocaine-heroin	1.13	0.24	0.10
cocaine-cannabis	6.32	1.80	0.55
cocaine-amphetamines	2.22	0.27	0.09
heroin-cannabis	1.43	0.37	0.13
heroin-amphetamines	0.90	0.11	0.04
cannabis-amphetamines	2.80	0.40	0.12

Prevalence

Substances	lifetime	last year	lasth month
cocaine-heroin-.cannabis	1.11	0.25	0.09
cocaine-amphetamines-cannabis	2.23	0.28	0.06
heroin-amphetamines-cannabis	0.91	0.12	0.03
cocaine-amphetamines-heroin	1.14	0.10	0.03
Substances	lifetime	last year	lasth month
cocaine-heroin-cannabis-amphetamines	0.81	0.10	0.02

Comments

- As can be seen there is a wide overlapping.

- Specifically, most heroin or amphetamines users also use cannabis and/or cocaine and possibly is difficult clearly defining which is the main substance of use.

- Though still existing problems related to representativeness of IPSAD study, the indications can be considered fairly robust.

Conditional distributions

Substance	Last Month	Registered users (personal use)
cocaine	9.14	15.85
cannabis	87.13	77.52
heroin	1.94	6.46
amphetamines	1.79	0.17
total	100.00	100.00

Comparison

- Taking into account that "Last Month" distribution is the distribution of the substances used by consumers, whereas "Registered users" distribution is the distribution of subjects, registered for personal use of drugs, by main drug, the two distributions are fairly consistent.

What next? Data driven models and methods

- It is necessary to focus on data available for estimation to reach a suitable definition which allows acceptable cross country comparability.

- Possibly only different problematic sub-populations might be estimated on the basis of different Data Bases in different Countries.

- Suitable data generation models are necessary.

Data generation processes

- Data generation processes in each country strongly depend on the drug law and its implementation and on policy measures.

- According to the law and policy implemented, different hidden sub-populations are at risk of becoming visible and of being registered in a data base.

- The estimation methods can just measure the size of such sub-populations related to the different available data-bases.

Graph of the relationships between observable variables and hidden phenomena (ITALY)
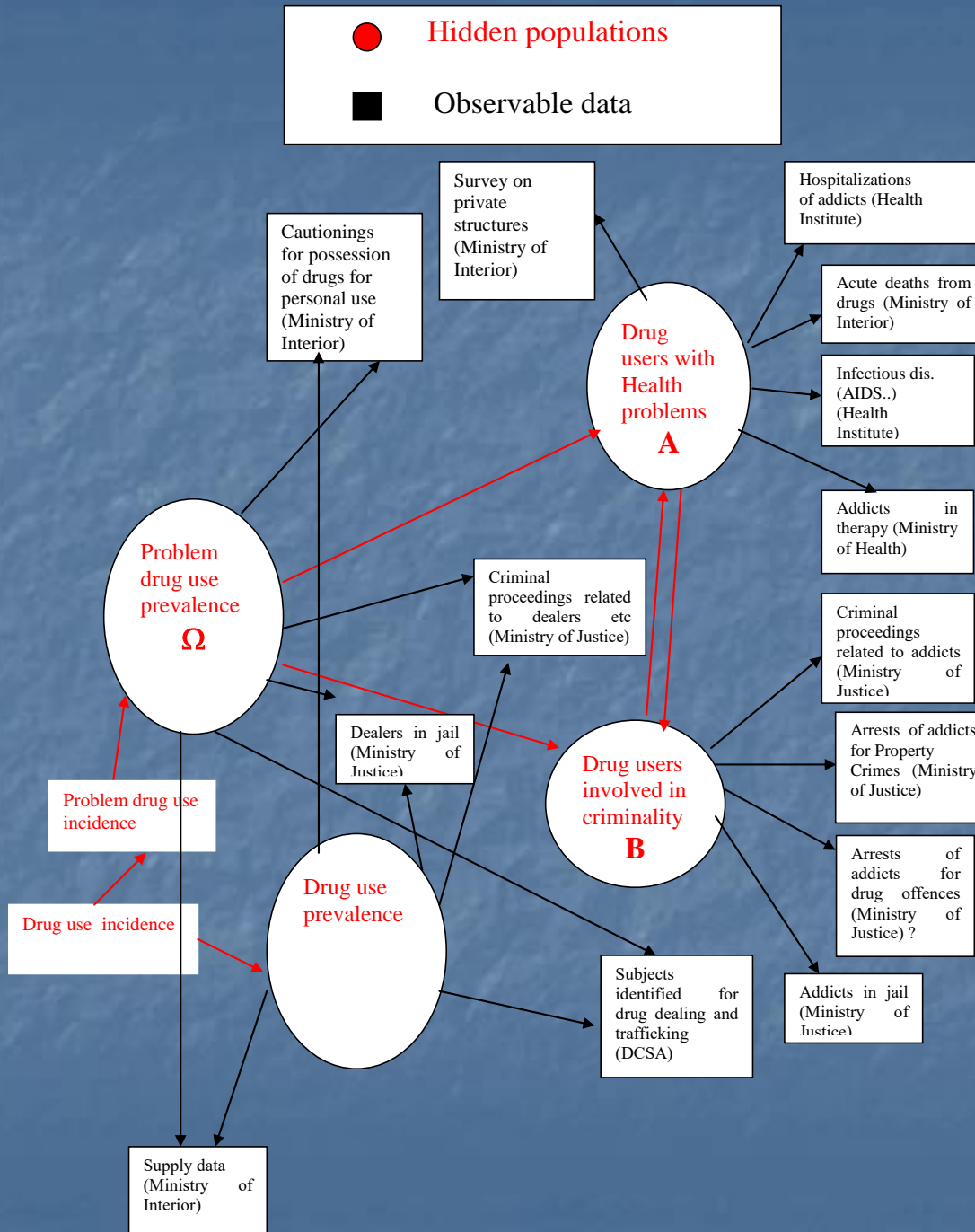
Extent of the overlapping
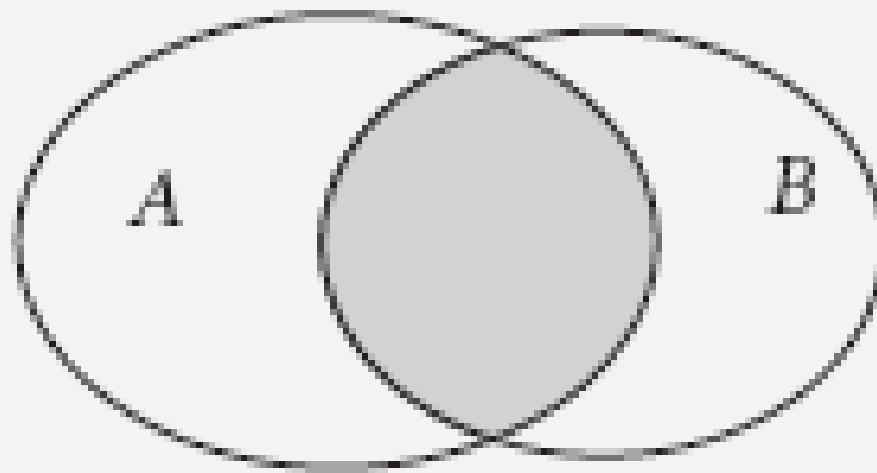
$A \cap B$

Different drug use epidemics

- Heroin/Opiates epidemics (nineties in Central and Southern Europe);
- Amphetamine epidemics (nineties in Sweden and some other northern countries);
- Crack/cocaine epidemics (nineties in US).
- For all these cases the overlapping was almost complete:

$$\Omega \cong A \cong B$$

Thus the observable events come from the same population. This is especially verified for heroin epidemics.

New trends, new challenges

- Presently the overlapping is not so big, especially for non-opiate use.

- The populations generating some kind of registration (data) are different for different archives.

- In a typical capture-recapture table, the different cells come from different sub-populations.

Implications for estimation methods

- If (and only if) the different archives are generated by the same (and close) population they can be used to apply capture-recapture methods with multiple sources.

- The same applies to multiple indicator methods.

Present possibilities to produce estimates

- Provide a proper data generation model for each available data set, properly defining the target population connected to that data set.

- Use a simple multiplier method or a generalized truncated Poisson method (GTPM) to estimate the hidden part of the target population.

Examples

- From treatment data, estimates can be obtained for the population of individuals eligible for treatment, by main drug.

- From multiple registration in any archive, where available, estimates can be obtained for the corresponding target population by means of GTPM.
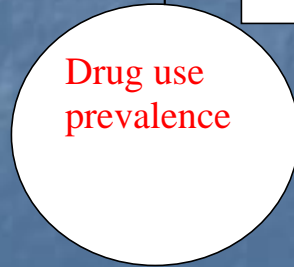
● Hidden populations

■ Observable data

Cautionings for possession of drugs for personal use (Ministry of Interior)

Available data allows to apply the Truncated Poisson Model to mirror the data generation process and estimate the population at risk of registration

Drug use prevalence

Estimation of consumers based on supply data

What next? Perspectives

- Extensive modelling approach to mirror the links (static and dynamic) between the different target populations in order to model the various data generation processes and properly adapt multiple source capture-recapture methods.

- Incorporate, by proper modelling, information coming from supply data bases or other external information. Possibly try to estimate the size of the population of dealers.
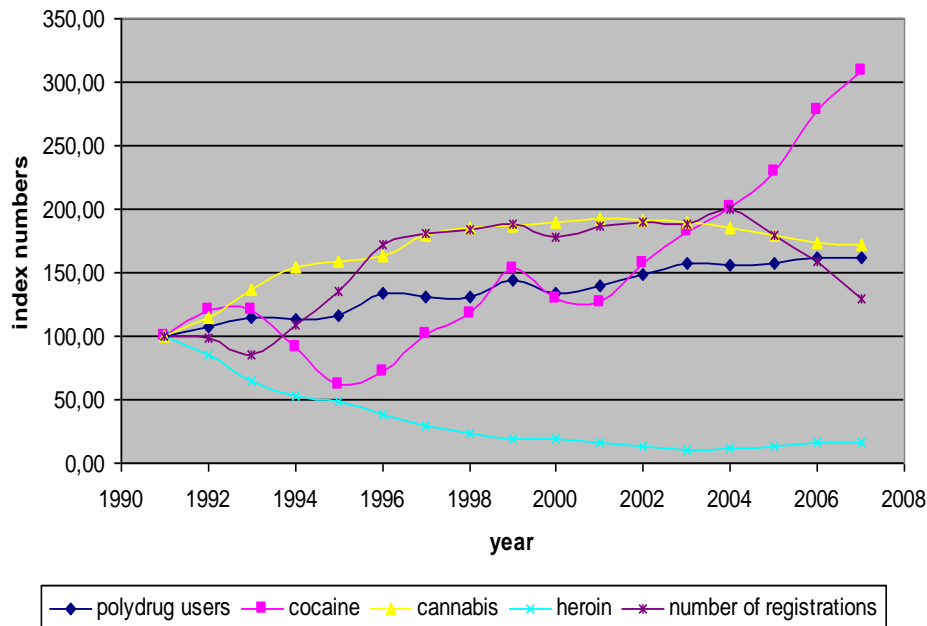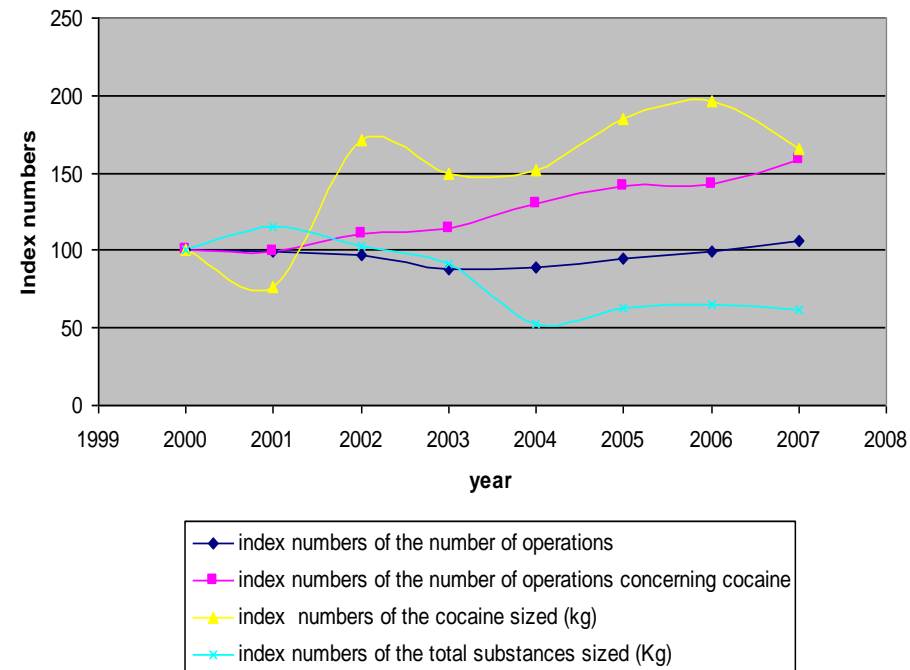
Evidence of cocaine epidemics

Demand side data

Supply side data

Comparison between demand and supply indicators

Index numbers of indicators from demand and supply side
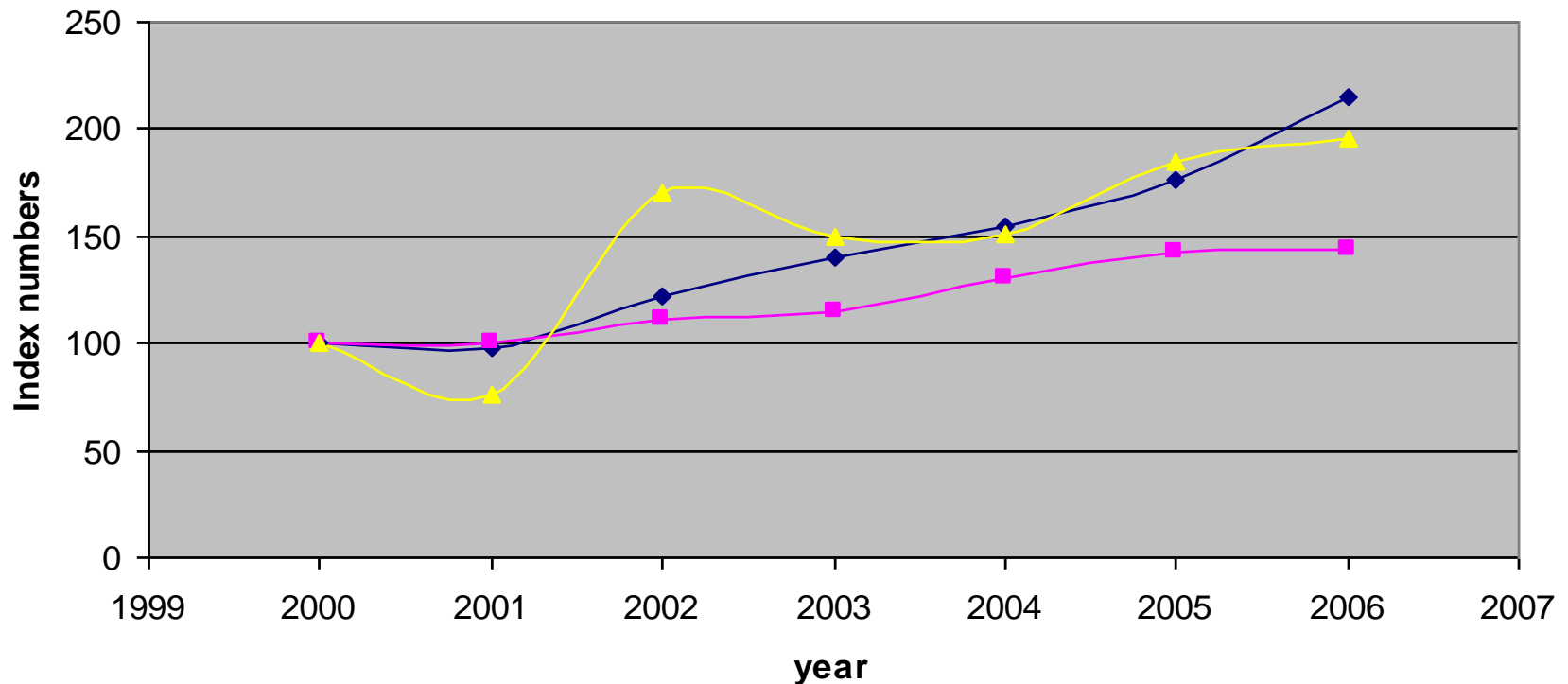
Estimation of the dealer population

- Data: proceedings for dealing drugs in the period 2004-2007 with multiple capture information;

- Method: Truncated Poisson with latent heterogeneity;

- Estimate: 400,000;

- What next: a model is needed to link the dealer population and the consumer population.