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THE PREVALENCE OF INJECTING DRUG USE IN ESTONIA, 2004

STUDY REPORT

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November 30, 2005
TARTU

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INTRODUCTION

In the third decade of the AIDS era, new HIV epidemics continue to emerge. The newly independent states of the former Soviet Union have undergone tremendous socio-political upheaval, and several related health epidemics have emerged. Morbidity and mortality rates have risen (Leinsalu M, 2004) so have increased violence, high-risk sexual behaviour, substance abuse, and infectious diseases, including HIV, viral hepatitis, sexually transmitted diseases (STDs), and tuberculosis (Dehne KL, 2001; Uusküla A, 2002). The centre of the health crisis appears to be Estonia. Estonia has rapidly expanding HIV/AIDS epidemic, and the highest reported incidence rate and prevalence of HIV (1.5%) in the European region (www.afew.org, www.who.int). This epidemic is in large part due to injection drug use, a problem common to many countries in the region (Aceijas C, 2004; Kalichman SC, 2000).

For Estonian health authorities, the prevention of HIV/AIDS and other sexually transmitted diseases is one of the priorities in national health programs (Estonian Ministry of Social Affairs, National development plan 2001). The government of the Republic of Estonia approved *National HIV/AIDS Prevention Program for 2002-2006* in 2002, and new national strategic program is currently in development. Rearrangement of epidemiological monitoring and analysis of HIV infection spreading, as well as evaluating the efficiency of HIV/AIDS prevention activities are among several objectives of this new program.

In response to HIV epidemic, Estonia has applied for and received funding from *Global Fund to fight AIDS, Tuberculosis and Malaria.* Activities of the program titled *National Partnership to Increase the Scale of Estonia's Response to a Concentrated and Rapidly Developing HIV/AIDS Epidemic* started in the end of the year 2003, with the overall goal to stop the progressive spread of HIV in Estonia by 2007. This goal ties in with the goals towards which the current national HIV/AIDS program is working.

One of the seven specific objectives in this program is to reduce the risk of harm faced by injecting drug users. Prevalence estimates are required to support the monitoring of this and other objectives.

Difficulties concerning appropriate focuses of these prevention efforts are especially clear in countries where HIV remains concentrated mainly among those sub-populations whose behaviour puts them at high risk for contracting and transmitting HIV. Many governments find it politically difficult to invest in services for injecting drug users, men who have sex with men, and female sex workers and their clients, and yet in Estonia (as in many other countries) these sub-populations are still among the most important focal points for effective HIV prevention.

In Estonia, the surveillance of communicable diseases (incl. HIV, hepatits B and C, sexually transmitted diseases) is based on the universal mandatory notification of newly identified cases to the State Health Protection Service (the same reporting principles have been used throughout the last decades). The government is now aiming at and investing in establishing surveillance systems that track the distribution of HIV and behavioural pattern that spread it in the high-risk sub-populations. However, even the best existing surveillance systems have one central weakness. While they can measure the level of risk behaviour, HIV and STD infection in the given sub-population, they cannot give any indication about the total size of the subpopulation itself. Recognising this as a limitation, many countries have begun to make attempts to estimate the size of the populations with high HIV risk. No standardised methods are currently available to guide this process, but many different approaches have been tried (Pisani E, 2003).

Traditional population surveys would not enable us to estimate population size in hard to reach groups, such as injecting drug users, but it is possible using indirect methods, such as multiplier or nomination techniques or capture-recapture technique. *Multiplier techniques* for population size estimation work by making informed assumptions about: (1) A multiplier*:* the proportion of cases in a studied population who experience the event (such as an overdose, imprisonment, death) during a certain time period; and (2) A benchmark*:* the number of such events that are known to occur. Benchmark data are generally obtained from existing data sources and routine information systems. *Capture–recapture (CRC) method* used in epidemiological studies and in studies of injecting drug use has been described in more details by Bishop YMM (1975), EMCDDA (2000), UNAIDS (2003) and UNDCP (2002). This method has been used in several recent studies estimating IDU prevalence. The estimates for injection drug use prevalence range from ~ 1% in Great Britain (Hickman M, 2004) to 5.4% among registered adult population in Togliatti, Russian Federation (Platt L, 2004). In short, CRC techniques take the overlap between two or more data sources and estimate the number of the target population not described by any data sources, and hence derive estimates for the total population. Problem drug use encompasses criminal and health problems suggesting that CRC studies should obtain at least one data source from both police or criminal justice and treatment in order to target the population (Hickmann M, 1999).

Reasons for developing reliable estimates for the size of populations at high risk for HIV lay in two major areas: policy and planning.

I. The area of policy encompasses advocacy, response planning and resource allocation, plus estimations on numbers of HIV infected and perspectives of the disease burden.

II. The area of planning encompasses intervention planning, measurement of coverage, and monitoring and evaluation of interventions.

Perhaps the most politically sensitive use of estimates for the size of at-risk populations is in determining the number of people infected with HIV in any country. In countries where HIV has spread throughout the population, HIV prevalence rates measured in pregnant women are used for estimations (with a few standard adjustments, to the whole sexually active population to arrive at a national figure). In countries where HIV is concentrated in specific sub-populations, surveillance systems should concentrate on those populations (Pisani E, 2003).

The study was ordered by the National Institute for Health Development and financed from the resources of the Estonian Porgram of Global Fund to Fight AIDS, Tuberculosis and Malaria.

BACKGROUND

Drug-related deaths and mortality of drug users

In Estonia the Statistical Office is responsible for keeping the mortality register and collects information on causes of deaths (incl. causes of drug-related deaths and provides annual statistics on drug-related deaths (DRD). Data on (drug–related) deaths is coded (10th revision of International Classification of Diseases, ICD-10), and entered into the electronic database. The DRD data quality is insufficient due to the lack of funds for forensic investigations leading to high proportion of cases with unknown toxicology (Talu A, 2004).

There was a remarkable increase in the number of drug-related deaths reported in the period 1997–2002 (Talu A, 2004). Data on the distribution of the acute/direct drug –related deaths by age and gender is presented in Tables 1 and 2.

In 2003, there was a remarkable decrease in DRD – the total number of cases recorded in Estonia was 36, accounting for more than fifty per cent decrease, if compared with the year 2002 (n=86). Majority of the DRD cases (N=31) were young male aged 15-29; 77% of the deceased were ethnic Russians, 17% ethnic Estonians, in two cases (6%) the deceased belonged to other ethnic groups (a Mari and a Belarusian) (Abel K, 2005). Five cases of death were attributed to opioids, 2 to methadone, 1 to cocaine, 18 DRD cases referred to as caused by the use of "other and unspecified psychodisleptics" (ICD-10 T409), and 10 by the use of "other and unspecified narcotics" (ICD-10 T406.5). The unspecific codes used suggest that the results of toxicological test were not known, either it was not done (in the majority of cases) or the result were not available to the mortality registry. In 2002, all the

cases with known toxicology were attributed to the use of opiates, mostly heroin (Denissov G, 2005).

Table 1. The distribution of acute/direct drug –related deaths by age, 1997-2003.

Age group	Year						
	1997	1998	1999	2000	2001	2002	2003
<15					1		
15-19			5	2	7	18	6
20-24	1		8	13	18	39	10
25-29	2	3	3	8	10	16	9
30-34			1	4	3	8	3
35-39	1	1		1	4	3	3
40-44		1	1		1		1
45-49			1	2		1	3
50-54		1	1		1	1	
55-59			1				
60-64		1					1
>=65			1	1			

Source [1]

Table 2. The distribution of acute/direct drug-related deaths by gender, 1997 – 2003.

Gender	Year						
	1997	1998	1999	2000	2001	2002	2003
TOTAL	4	7	22	31	45	86	36
male	3	6	18	25	39	81	31
female	1	1	4	6	6	5	5

Source [1]

Drug-related infectious diseases (Figure 1).

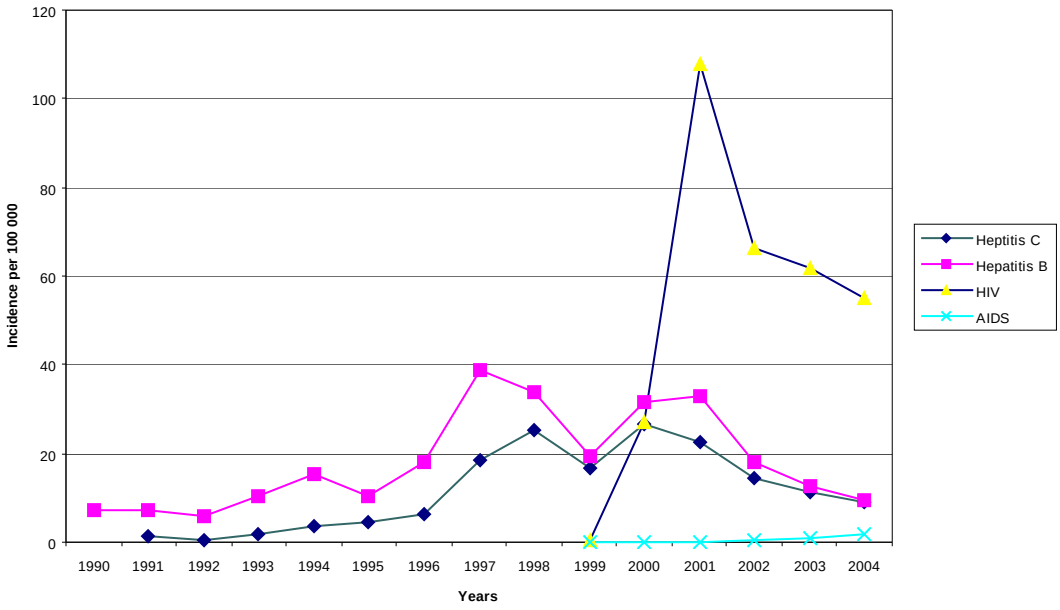
The first HIV positive person was reported in Estonia in 1988. Up to date the total number of HIV cases reported in Estonia is 4832. In 2002, 24-years-old or younger persons accounted for 72% of new cases, in 2003 it was 66%, and in 2004 61%. The proportion of women among those newly diagnosed with HIV infection has increased from 20% in 2000 to 32% in 2004. The majority of reported females are of reproductive age (15–29 years old). The

[1] STANDARD TABLE TAB 06. Evolution of ACUTE / DIRECT drug-related deaths figures compiled by the EDMC to the EMCDDA (2004)

epidemic was first recognized northeast Estonia (Ida-Virumaa county): 92% of newly diagnosed HIV cases were detected among the residents of this area in 2000. Already the next year the number of cases grew also in Tallinn, the capital of Estonia. In 2004, 57% of the new cases were diagnosed among the residents of Ida-Virumaa county, 36% among residents of the capital and 7% elsewhere. The percentage of new cases detected among prisoners was 28,5% in 2001, 27% in 2002, 31,7% in 2003, and 21,9% in 2004. The majority (89%) of the imprisoned persons infected with HIV are men aged 15–24. Currently about 12–13% of all persons in Estonian prisons are infected with HIV (Rüütel K, in press).

Marked increase in HIV incidence in Estonia was preceded by increase in the numbers of registered cases of hepatitis B and hepatitis C resulting from the spread of injecting drug use (Priimägi L 1998; Tefanova V, 1998). Between 1994 and 1997, there was almost five-fold increase in the absolute numbers of people infected with hepatitis B and C (Health Protection Inspectorate) (Figure 1). Those affected were young: among the registered new cases, 50% of those diagnosed with HBV and 52% of those diagnosed with HCV were 15-19 years old in 1997 (Priimägi L, 1998). In 2004, all in all 124 cases of acute hepatitis C and 127 cases of hepatitis B were reported in Estonia, and majority of the cases were diagnosed in IDUs (71.1% and 70.6% of HCV and HBV infections, respectively) (Abel K, 2005). In the sample of 162 IDUs recruited from SEPs in Tallinn in 2004, hepatitis serologies were as follows: 85.1% (131/154) tested positive for antibodies to HBcore, 21.3% (33/155) tested positive for HbsAg, and 96% (153/159) tested positive for HCV antibodies (Uusküla A, in press). Reported incidence of hepatitis C and B have been decreasing since 2002.

Figure 1. The incidence of selected bloodborne infections in Estonia, 1990-2004.



Source [2]

Other drug-related morbidity

According to the Estonian Health Statistics, the number of patients admitted to care for psychiatric and behavioural disorders caused by the use of illegal drugs tripled during the late 1990s (24.5 / 100000 in 1995, 82.2 / 100 000 in 1998). The behavioural disorders caused by the use of opioids (as an imperfect proxy indicator of injecting drug use) have decreased since year 2002 (www.sm.ee, 15.11.2005) (Table 3).

Table 3. Mental and behavioural disorders due to opioid use, 1998-2003.

[2] Health protection inspectorate

Source [3]

Drug offences

There was a marked increase in total numbers of drug offences (both criminal offences and misdemeanours) registered by the police during the period 1998 – 2004 (Table 4). Criminal

ICD-10 code	Acute intoxication	Harmful use	Dependence syndrome	Withdrawal state	Withdrawal state with delirium	Psychotic disorder	Other disorders	Total	Per 100 000 population	Year
	X=0	X=1	X=2	X=3	X=4	X=5	X=6,7			
F11.X	8	36	934	653	0	8	14	1653	122,1	2003
F11.X	5	13	2218	693		4	1	2934	216,0	2002
F11.X	9	36	1590	780	2	2	2	2421	177,5	2001
F11.X	8	70	1828	1209		11	23	3149	230,0	2000
F11.X	5	34	1057	666		2	40	1804	125,1	1999
F11.X	7	147	482	241		0	1	878	60,6	1998

offences accounted for 16% of all drug offences in 2004. Overwhelming majority of all drug offences (77%) were registered in Tallinn, followed by Ida-Virumaa county (13%) (Abel K, 2005).

Since September 1, 2002, the new Penal Code entered into force, and repeated use of illicit drugs or possession of a small amount of illicit drug for personal use was decriminalized and such offences were reclassified as misdemeanours (Talu A, 2004).

Table 4. The number of drug offences registered by the police in 1998-2004

Drug offences	Year						
	1998	1999	2000	2001	2002	2003	2004
Number of criminal offences	235	297	1581	2301	1217	1170	1099
Number of misdemeanours	382	489	3398	4667	3965	5214	5869
Total number of drug offences	617	765	3886	5458	4761	6384	6968

Source [4]

[3] Estonian Ministry of social affairs
[4] Estonian police board

A few attempts have been made to estimate the prevalence of injection drug use in Estonia. An expert panel of key-professionals held by the Estonian Foundation for Prevention of Drug Addiction gave an estimated number of 12000–15000 IDU-s in the whole country (EFPDA, 2000). A study conducted in 2003 by Dr. Kalikova and AIDS Support Center, used two estimation approaches: multiplier and direct two-sample capture-recapture method. For multiplier method, data from cross-sectional survey of 287 IDUs (2 cities in northeast Estonia: Narva and Sillamäe) was combined with data from local official sources. For capture-recapture research, the workers in the area distributed coloured cards among the drug injectors; an independent recapture was conducted later in the same area and proportion of captured IDUs that already had the previously given card was calculated (Hay G, 2003). There was wide variation in the estimates derived from different multipliers, with some estimates being clearly erroneous. The two-sample capture-recapture method carried out in Ida-Virumaa apparently did not to work, as in Narva there were 203 cards distributed at the beginning and 91 out of the 154 people who were contacted later had the coloured card, thus the estimated number of injectors in Narva was calculated to be 344. This estimate is far too low, particularly considering the number of injectors in contact with the area's needle exchange program. The failure to derive reliable estimate was most likely related to the violation of the independency criteria in the sample and equal, non-zero probability of IDUs in that area to end up in the captures. The two-sample capture-recapture method offered similar extremely small estimates in Sillamäe and Tallinn (Hay G, 2003). According to these evaluations, the methodology and techniques used did not provide real estimations of IDU population due to the lack of a solid datasets, inconsistency of definitions and time frames.

STUDY TEAM

The team consisted of the following groups:

University of Tartu	Anneli Uusküla – principal investigator
	Kristiina Rajaleid – statistician
National Institute for Health Development	Ave Talu – investigator
	Katri Abel – investigator
	Kristi Rüütel – investigator
Imperial College London, UK	Natalia Bobrova – informal consultation (Appendix 8)
Estonian Health Insurance Fund	Maie Thetloff, head of the health economics department, data abstraction
National HIV / AIDS reference laboratory	Valentina Ustina, head of the laboratory
	Irina Malõgina, specialist, data abstraction
Estonian Police Board Police Work Department Analysis and Planning Division	Karin Mumm, chief specialist, data abstraction
Estonian Police Board Police Work Department Analysis and Planning Division	Marilis Sepp, chief superintendent, consultant

All the study activities were funded by Global Fund to Fight AIDS, Tuberculosis and Malaria program in Estonia.
The Ethics Review Board of the University of Tartu has approved all the study procedures (protocol number 138/17 dated 23.05.2005).

AIMS OF THE STUDY

(1) To evaluate the feasibility of IDU prevalence estimations based on routine nation/state wide data sources, and
(2) To provide estimates of IDU prevalence in Estonia in 2004 using multipliers and capture-recapture methodology.

METHODS

1. Data sources

- *Estonian Health Insurance Fund (EHIF)*

Estonian Health Insurance is social insurance that relies on the principle of solidarity: the Health Insurance Fund covers the cost of health services required by the person in case of illness regardless of the amount of social tax paid for the person concerned. Coverage is based on residency, not on citizenship. The Fund also uses the social tax paid for the working population to cover the costs of health services provided to persons who have no income resulting from work activities. Health insurance in Estonia is funded through a compulsory scheme under which employers are obliged to pay social and health insurance tax for their employees. Self-employed persons pay social tax for themselves, based on their income. The persons for whom social/health insurance tax is paid or who have paid it themselves are considered to be covered by health insurance ("the insured") and are members of the Health Insurance Fund. Such compulsory health insurance scheme came into effect on January 1, 1992. As of December 2004, the number of insured persons registered by the EHIF was 1,269,960, making up 94.3% of the population of Estonia (N=1347000). The performance of the health insurance fund is underpinned by an IT system using modern information technology. EHIF database is a “reimbursement database” (thus considered to be relatively complete) that includes information on ambulatory and in-patient/hospital care as well as on reimbursed medications. Emergency care (including acute life-threatening overdose treatment) is available regardless to the person’s insurance status.

The share of public spending on health care was 76.3% in 2002 (Jesse M, 2004). Private sources of health care financing accounted for 23.7% of total expenditure on health care, and are not quoted in the EFIH data source.

- *State HIV Reference Laboratory*

HIV testing started in Estonia in 1987. For HIV, hepatitis and tuberculosis testing, comprehensive laboratory quality assurance systems and national reference institution exist. 32 primary diagnostic laboratories located at bigger medical institutions perform HIV biological surveillance, and the State HIV Reference laboratory is only site conducting confirmatory testing: all samples with positive HIV EIA antibody testing results are sent to the State Reference Laboratory for confirmatory testing.

In Estonia, HIV testing is voluntary and it may be performed only upon the person’s informed consent. However, the testing of donor blood and transplanted organs is obligatory (according to the Act of Infectious Diseases Prevention and Combating). HIV testing is

recommended for all pregnant women, persons with sexually transmitted diseases and tuberculosis patients. Anonymous voluntary counseling and HIV-testing services are available in five major towns. Altogether 199,279 HIV tests were performed in 2004 (State HIV Reference Laboratory). According to legal regulations, all samples sent for HIV testing have to be coded on the testing form to identify the category to which they belong (see Appendix 4). Some of the categories reflect (i) supposed transmission mode of HIV infection (i.e. sexual contact of HIV-positive person), some reflect (ii) institution where the person was tested (prison, anonymous cabinet), or (iii) medical/other indication why the person was tested (blood donor, pregnant woman, patient with STI). There are a all in all 14 categories, and category # 102 refers to 'illicit drug user'. In principle, every person who is tested could fall into several categories at the same time (for example - person tested in anonymous cabinet who is an injecting drug user). In national reference laboratory all the different codes for one person are recorded, and one of the codes is considered to be primary.

- *Police: drug-related offences*

Data on drug-related offences (drug crimes and misdemeanours) detected and registered by police was abstracted from the POLIS database. POLIS is a state-wide personalized database which consist of data on all registered crimes. Information on criminal offences is gathered from four Police Prefectures (Northern, Eastern, Southern and Western Police Prefectures) and two Police agencies (Central Criminal Police, Estonian Forensic Service Centre). According to police information, the POLIS database is relatively complete given the mandatory character of reporting, technical control and audits made on regular basis. Heads of the police prefecture and directors of the police agencies are responsible for completeness of the data. POLIS is an administrative database where specific information on the means of administration of illicit of drug (i.e. injected or other) is not collected.

- *State agency of statistics*

Statistical database presents official statistics, collected with official statistical surveys confirmed by Estonian government. Statistical databases and regional development databases could be divided into four main areas — economy, environment, population and social statistics. The data on Population and Housing Census, and Agricultural Census are presented separately.

- *Cross-sectional survey of IDUs (2005).*

A cross-sectional anonymous survey of IDUs recruited using respondent driven sampling was carried out in Tallinn and Kohtla-Järve during 5 weeks in May and June 2005. All participants reported injecting within the previous 4 weeks provided informed consent and a blood sample (dry blood spot) for HIV testing. 350 IDUs were recruited in Tallinn and a subsample of 100 IDUs in Kohtla-Järve. Results of the study are provided elsewhere (Uusküla A, 2005. Project report to GF / NIHD), selection of demographic indicators from this study are presented in the Table 5.

Table 5. Mean age and gender of the participants in the cross-sectional HIV / risk behaviour survey, distributed by site.

Site	Tallinn	Kohtla-Järve	Total
Mean, median age (years)	24.2 (24)	24.2 (24)	24.2 (24)
Gender (% male)	83 %	85 %	84 %
Total	350	100	450

A complementary questionnaire collected data on contacts with benchmarks for the multiplier study as a part of the risk-behavior survey. The benchmark information was collected for the specified period (from 01.01.2004 to 31.12.2004), and included the following: initials of the person; date of birth; gender; residence in Estonia during the specified period; testing for HIV within the specified period; reporting on IDU status while testing for HIV; history of arrests, history of arrests related to drug use; history of drug overdose; history of drug treatment (Appendix 5. Multiplier questionnaire).

2. Data sources, descriptions of abstractions and definitions. Table 6.

	Police POLIS database	**Estonian Health Insurance Fund**	**State HIV Reference Laboratory**	**Cross-sectional survey of IDUs** [1]
Coverage	State wide	State wide	State wide	N=450
Period of coverage	01.01.2004-31.12.2004			Respondents were specifically requested to recall for the period of 01.01.2004-31.12.2004
Information recorded	• Initials (first name, surname) • Full date of birth (day/month/year) • Gender • Injecting Drug User or marker [see the next row] • County of offence event/ health care services provider/ testing/residence (site)			
Definition for IDU	Cases of drug- related offences (i.e. unlawful acquisition or storage of a small quantities of narcotic drugs or psychotropic substances, or use of narcotic drugs or psychotropic substances without doctor's prescription (Article NPAS §15[1]) [2]	In/out-patient treatment (billing) episodes/records for the health condition coded according to ICD-10 as *Overdose (life threatening non-fatal)*: T40 (T40.0, T40.1, T40.2), and F11.0 [3] *Drug treatment*: F11.1-F11.9 [4]	HIV positive testing results recorded under category 102 (user of illicit drugs) [5]	Current IDU defined as self-report on injecting within the previous 4 weeks, and finding of injection marks on the skin.
Age range	15-44 years [6]			
Character of abstracted data	Not allowing personal identification			
Connections to other databases	None			
Form of the available data	Electronic data bases			Per protocol [7]
Local	Study design and characteristics of the information abstracted from databases were evaluated and approved by			

permission obtaining	Estonian Data Protection Inspectorate.			
Access to data: procedure, permissions	Permission to access the data was gained and abstraction coordinated with the Chief Superintendent of the Police work department, Analysis and Planning Division Ms. Marilis Sepp (see Appendix 1).	Permission to access the data was gained and abstraction coordinated with the head of the department of EHIF health economics Mrs. Maie Thetloff (see Appendix 2).	Permission to access the data was gained and abstraction coordinated with the head of the laboratory Dr Valentina Ustina (see Appendix 3).	
Potential sources for biases	The police arrest data do not record whether an individual committing criminal offence is an injector. It was assumed (according to local expert opinion) that all subjects arrested for small quantities of drugs under Article NPAS §15[1] were IDUs [8].	Preferential access for ending up in the EHIF 'drug treatment' dataset among those insured in EHIF. The same does not apply to the EHIF 'overdose' dataset.	Major underreporting of IDU status while testing for HIV. Substantial proportion of actual IDUs are categorized under the category 114 (anonymous testing), 112 (tested at prison), etc (Appendix 4).	Potential re-call, social desirability biases might lead to underreporting of events inquired.

[1] Detailed information on study design, results are provided elsewhere (Uusküla A, 2005. Project report to GF / NIHD).

[2] From 30.08.2002 until 2005 Article NPAS §15[1]– drug abuse or possession of a small amount of drugs for personal use.

[3] *Overdose (life threatening non-fatal*: (i) T40 Poisoning by narcotics and psychodysleptics (T40.0 Opium, T40.1 Heroin, T40.2 Other opioids); (ii) F11.0 Mental and behavioural disorders due to use of opioids: acute intoxication.

[4] *Drug treatment*: F11.1-F11.9 Mental and behavioural disorders due to use of opioids;

[5] By legal regulations every sample sent for HIV testing has to be coded (on the testing form) to identify the transmission category it belongs to (see the list of categories in the Appendix 4);

[6] 15-43 in the cross-sectional survey;

[7] All the data was entered twice using data entry program *Epi-info*, and compared to detect mistakes and correct them. Cleaned data set was allocated for additional simple range checks to ensure quality;

[8] According to the information from key informant interviews (heads of the counties' Police departments), an estimated 80 – 95 % of the drug users arrested/detained at the Ida-Virumaa county are IDUs, 67-85 % in Harjumaa (Talu A, personal communication).

3. Methods used for estimating IDU population size.

Capture-recapture method

Data sources of injecting drug users were identified (see above), collated and matched using gender, day/month/year of birth, initials to identify the subjects on one, two, three or more data sources. Only exact matches were used on the following data sources: HIV positive test results recorded at the State HIV reference laboratory (N=85); Police arrest data on individuals arrested for the possession of illegal drugs in small quantities (N= 2716), EHIF overdose data abstraction (N=111) and EHIF drug treatment abstraction (N=360). Analysis was conducted on those aged 15–44 years. Population prevalence was calculated using official registered population as denominators (Appendix 6). Poisson regression models were fitted to the observed data, with interactions between data sources fitted to replicate 'dependencies' between the data sources. The best-fitting model was selected on the basis of standard information criteria, and it was used to estimate the number of IDU 'not observed' in any data sources, and thereby to obtain estimate on the prevalence of IDU. To select the best model, the goodness of fit ('G 2': the deviance between observed and expected values) was approximated by χ^2 distribution. Lower deviance implied that the observed and expected values were closer, indicating that the model fitted better. Models with the same number of interactions were compared using standard information criteria AIC (Akaike information criterion) and BIC (Bayesian information criterion) (Evans MA, 1994). Models with different number of interactions were compared using log likelihood ratio test.

The multiplier-method

In the context of problem drug use the total population of drug users *D* is unknown (partly hidden population). Given a sample of size *B* of the population in question (benchmark) and the probability *p* for someone of this unknown population to be a member of the sample, the total population *D* can be estimated from: $D = B/p$, where *B* = the number of identified problem drug users (sample or benchmark); *p* = a parameter giving the probability of a problem drug user (unknown target population) to be member of the identified sample *B.* The number of identified problem drug users (benchmarks) was derived from EHIF, Police and State HIV reference laboratory datasets. The value for *p* was estimated using independent external information (scientific literature, cross-sectional study).

RESULTS

Description of the data abstractions

All in all there were 6704 records identified as IDUs from the four data sources [Police (N= 5311); EHIF drug treatment and overdose (N=1299); and State HIV reference laboratory (N = 94)], and 3024 unique IDs after matching.

The total number of records and number of records included into the analysis after data cleaning is presented in Table 7. The main reasons for exclusion of 3,440 records from analysis were as follows: full identification information not available (N= 176, 5.1%); age outside the range 15-44 (N=208, 6.1%), multiple records for an ID (N=3056, 88.8%). Information on the county was missing for 12 (0.4%) cases, and discordant for 16 (0.5%) cases.

Table 7. Total number of records, and number of records included into the analysis after cleaning the data abstracted from data sources.

Data source	Police	EHIF	HIV reference laboratory	Total
Total number of records identified as IDU (for definition see Table 5)	5311	1299	94	6704
The number (%) of records where full identification was possible (initials, gender, day/month/year of birth)	5311 (100%)	1129 (86.9%)	88 (93.6%)	6528 (97.4%)
The number of records pertinent to the age group of 15-44 years	5247	1073	85	6320
The total number / % of records included into further analysis	5247 (98.8%)	1073 (82.6%)	85 (90.4%)	6320 (94.3%)
Number of unique IDs	2712	467	85	3264

More than three quarters (85.71 %) of the observed IDUs were male, and 63.06% were under 25 years. Demographic characteristics of 'study units' are provided in the Table 8. The police data source 'captures' proportionally more men IDUs than other data sources. The mean age is the highest in drug treatment database and the lowest in police database.

Table 8. Demographic profile of the injecting drug users identified.

Data source	**Police**	**EHIF**		**HIV reference laboratory**	**Total (after matching)**
		Drug treatment	Overdose		
Number of unique IDs	2712	357	110	85	3024
Mean age	23.5	24.3	23.8	24.2	23.7
Mean age by gender P-value (within data set)	M 23.8 F 22.0 P<0.001	M 24.6 F 23.2 (22) P=0.04	M 24.3 F 21.6 P=0.02	M 24.5 F 23.3 P=0.34	M 23.9 F 22.3 P<0.001
Gender (% of men) P-value	M 2364 (87.0%) F 352 (13.0%)	M 275 (76.4%) F 85 (23.6%)	M 86 (77.5%) F 25 (22.5%)	M 65 (76.5%) F 20 (23.5%)	M 2592 (85.7%) F 432 (14.3%) P<0.001
Location (%) Harjumaa County Ida-Virumaa County Other locations in Estonia P-value	H 2028 (74.72%) IV 426 (15.70%) Other 260 (9.58%)	H 174 (49.57%) IV 145 (41.31%) Other 32 (9.12%)	H 79 (74.53%) IV 20 (18.87%) Other 7 (6.60%)	H 65 (89.04%) IV 5 (8.22%) Other 2 (2.74%)	H 2163 (71.53%) IV 543 (17.95%) O 290 (9.59%) P<0.001

Capture-recapture method

All in all 223 (7.37%) IDs were matched in more than one data source, and 4 (0.13%) were matched in all four data sources (Table 9). No matched records in all four sources were found for any females. There were 139 (4.60%) matches within police arrests and EHIF drug treatment records, 39 (1.29%) matches within police arrests and EHIF overdose records; 2414 (93.13%) of males and 387 (89.58%) of females were present in only one data source;

for both male and female subjects, the largest proportion of overlap was found within police arrest and drug treatment databases (4.24% for males and 6.71% for females).

Table 9. Numbers of IDUs and overlap between four data sets.

Data sources				Number of records by gender		
HIV ref lab	**Police arrests**	**EHIF Drug treatment**	**EHIF Overdoses**	**Males**	**Females**	**Total**
no	no	no	no	.	.	.
no	no	no	yes	34 (1.31%)	16 (3.70%)	50 (1.65%)
no	no	yes	no	146 (5.36%)	48 (11.11%)	194 (6.42%)
no	no	yes	yes	3 (0.12%)	2 (0.46%)	5 (0.17%)
no	yes	no	no	2193 (84.61%)	312 (72.22%)	2505 (82.84%)
no	yes	no	yes	36 (1.39%)	3 (0.69%)	39 (1.29%)
no	yes	yes	no	110 (4.24%)	29 (6.71%)	139 (4.60%)
no	yes	yes	yes	5 (0.19%)	2 (0.46%)	7 (0.23%)
yes	no	no	no	41 (1.58%)	11 (2.55%)	52 (1.72%)
yes	no	no	yes	1 (0.04%)	0 (0.00%)	1 (0.03%)
yes	no	yes	no	3 (0.12%)	2 (0.46%)	5 (0.17%)
yes	no	yes	yes	0 (0.00%)	1 (0.23%)	1 (0.03%)
yes	yes	no	no	9 (0.35%)	4 (0.23%)	13 (0.43%)
yes	yes	no	yes	3 (0.12%)	1 (0.23%)	4 (0.13%)
yes	yes	yes	no	4 (0.15%)	1 (0.23%)	5 (0.17%)
yes	yes	yes	yes	4 (0.15%)	0 (0.00%)	4 (0.13%)
				2592 (100.00%)	432 (100.00%)	3024 (100%)

The matching indicated that the strongest interaction occurred between HIV reference laboratory and EHIF overdose data, followed by HIV reference laboratory and EHIF drug treatment data, and the two EHIF data sources. The interaction was weakest for HIV reference laboratory and police arrest data. Police arrest data had the strongest interaction with EHIF overdoses datasets. All the databases were pairwise positively correlated.

First a Poisson model was fitted to the unstratified data (male and female combined) (Table 10). The best fitting model included all the pairwise interactions besides the interaction between HIV reference laboratory and police arrest data (Table 10). This model was selected on the basis of AIC and BIC and the log likelihood ratio test showing that more complex models were not significantly better (Appendix 7). It resulted in an estimate of 12,665 IDUs (range 6898- 28782).

For male population, the best fitting model included the same interactions as the model for unstratified population. The estimate of male IDU population in Estonia was 12,387 (range

7119 - 30600), and the estimated ratio of observed to unobserved male IDUs of 1 : 5 (95% CI 1:2.7 - 1:11.8).

For female population the same model was used as for male and total population. Overall for females we estimated a population of 1414 (95% CI: 1059-4132), which translates as a prevalence of 0.48% (95% CI: 0.36-1.42%). We estimate that the ratio of observed to unobserved female IDUs is 1 : 3 (95% CI:1:2.5-1:9.6).

Combining the estimates for male and female population gives an overall estimate of 13801 (95% CI: 8178-34732) IDUs state wide, which translates as a prevalence of 2.4% (95% CI: 1.4-6.0%). The estimated IDU prevalence in Harjumaa, Ida-Virumaa counties and rest of the Estonia are presented in the Table 11.

Table 10. Capture-recapture model estimates of the number of injecting drug users.

Model	Interactions	Deviance	d.f.	AIC	BIC	Observed	Estimated total (95% confidence interval)	Ratio estimate of unobserved population (95% CI)
Male and female combined	hiv-treat hiv-overd pol-treat pol-overd treat-overd	3.98	10	6.25	-9.56	3024	12665.12 (6897.75, 28781.86)	4.1 (2.3, 9.5)
Male	hiv-treat hiv-overd pol-treat pol-overd treat-overd	4.56	10	5.92	-8.98	2592	12386.93 (7119.18, 30599.77)	4,8 (2.7, 11.8)
Female	hiv-treat hiv-overd pol-treat pol-overd treat-overd	4.85	10	4.82	-8.70	432	1413.64 (1059.12, 4131.76)	3.3 (2.5, 9.6)
Total						**3024**	**13800.57 (8178.31, 34731.53)**	**4.6 (2.7, 11.5)**

Model selected on goodness-of-fit, likelihood ratio test, AIC and BIC. Data sources abbreviated as follows: hiv = hiv reference laboratory, pol = police arrest data, treat = EHIF drug treatment data, overd = EHIF overdoses.

Table 11. Covariate capture-recapture estimates of male and female injecting drug users in Estonia in 2004: size and prevalence of the IDU population.

	Size of IDU population (95% CI)	IDU prevalence (95% CI) *
Whole country	13801 (8178 - 34732)	2,4% (1,4 – 6.0%)
Male	12387 (7119 - 30600)	4,3% (2,5 - 10,6%)
Female	1414 (1059 - 4132)	0,5% (0,4 - 1,4%)
Harjumaa county	9963 (5904 - 25075)	4,3% (2,5 - 10,7%)
Ida-Virumaa county	2501 (1482 - 6295)	3,5% (2,0 - 8,7%)
Other Estonia	1199 (689 - 2962)	0,4% (0,3 - 1,1%)

* Population prevalence was calculated using official registered population as denominators (Appendix 6).

Multiplier method

We derived benchmark data from administrative state wide data sources identified and described in the course of study. Information on multipliers was derived from the cross-sectional HIV / risk behavior prevalence survey (Uusküla A, 2005) (Table 11). Several multipliers that we used gave implausible results, for example, lower that the observed data collected with another benchmark, implausible high estimate (N=55100).

Table 12. Obtained benchmarks, multipliers and estimated size of IDU population.

Benchmark	Multiplier	IDU population size estimate
30 HIV+ tests coded under the 'drug user' (102) category (State HIV Reference Laboratory)	The proportion of IDUs who had a positive HIV test in 2004 is assumed to be 19%	N = 158
166 drug users admitted for drug-treatment for psychiatric and behavioural disorders (ICD-10: F11.1-F11.9) (EHIF)	The proportion of IDUs who received drug treatment in 2004 is assumed to be 2%	N = 8300
46 drug users admitted into hospitals due to life threatening non-fatal overdoses (*ICD-10:* T40.0, T40.1, T40.2, F11.0) (EHIF)	The proportion fo IDUs who received overdose care at the emergency care departments in 2004 is assumed to be 3%	N = 1533

2204 Drug- related offences (NPAS §15[1]) (Police)	The proportion fo IDUs arrested due to the possession of illicit drugs in 2004 is assumed to be 4%	N = 55100

The estimated coverage with selected services and number of HIV+ IDUs is presented in Table 13. The data suggest that approximately one fourth of the IDU population might have attended SEP services as new clients, and one fifth have been arrested by the police due to the possession of small quantities of illicit drugs. The coverage with methadone treatment services is low. Also, the proportion of IDUs receiving care for life threatening overdose at the emergency care departments is very low.

Table 13 Selected public health indicators for IDUs in Estonia by gender in 2004.

Public health indicator	Proportion of the ESTIMATED number of injectors aged 15-44 using services		OBSERVED	
	Male	Female	Male	Female
Total number of IDUs	12387	1414	2592	432
Total number of persons arrested under Article NPAS §15[1]	17.7%	22.1%	2193	312
SEP total number of new clients	23.7%		3264	
Total number of persons receiving methadone treatment	2.4%		338	
Cases on non-fatal life threatening overdoses treated in the emergency departments	0.3%	1.1%	34	16
HIV positive cases estimated	7597	936	346* 3248 **	113 * 1191 **

* Cumulative cases reported associated with drug use (category 102), up to end of the year 2004.
** Cumulative cases reported up to end of the year 2004 (State HIV reference laboratory).

The prevalence of HIV has been shown to be high (56%, 62%) among IDUs in Estonia (Uusküla A, 2005 in press; NIHD/GF study report) in 2005. For the current estimation we used the following HIV prevalence: male IDUs 61.3%, female IDUs

66.2% (Uusküla A. GF/NIHD Study report). Taking our IDU estimates, we can see that there are potentially 8533 (range 5068-21503) HIV infections associated with IDU, representing 1.5% (range 0.9-3.7%) of the population aged 15-44 in Estonia.

DISCUSSION

This is the first attempt at deriving estimates for Estonia using multi sample capture recapture approach. We used data from administrative databases, therefore limitations and inadequacies in the level of detail available needs to be accounted for. Prior to interpretation of results we define the population, discuss validity of the assumptions and possible violations.

The primary objective of this research was to assess **feasibility of IDU prevalence estimation based on routine nation-wide data sources.**

Central consideration is that the number of IDUs identified on all four datasets was relatively small. Estimates of the unobserved population are very sensitive to the number of overlaps, and consequently the potential for bias is greater (Hickmann M, 1999), resulting in wide confidence intervals. Low level of overlap can be attributed to misclassification or inaccuracies of data. Bias can arise from inability to match the data one more than one source due to low quality of source data. However, police, EHIF and HIV reference laboratory records are reliable sources with high quality demographic data. The usability of data from these sources is supported by the low numbers of records that had to be excluded from the analysis due to poor data quality (i.e. missing information) (2.6% overall).

Low level of overlap can also be attributed to misclassification. For the prevalence estimates presented injection drug users status was defined as presented in the Table 5. Using these administrative databases, the definition of an IDU is broad and inclusive and reflects the nature of the data. Abstraction from the *police dataset* includes the possibility of counting small-scale dealers who are not users/injectors themselves. We know that in 2004, unlawful acquisition or storage of a small quantity of narcotic drugs or psychotropic substances, or use of narcotic drugs or psychotropic substances without doctor's prescription was the most common (47%) drug offence reported, followed by acquisition or storage of large quantities of narcotic drugs or psychotropic substances (45%), while other drug offences made up the remaining offences (8%) (http://www.pol.ee/index.php?id=476). Thus, it is reasonable to assume that the overwhelming majority of unlawful acquisition or storage of small quantities of narcotic drugs offence cases were attributable to actual drug users. According to the information from key informants, ~90 % of the drug users arrested/detained at the Ida-Virumaa county and close to 80% in Harjumaa are IDUs (Talu A, personal communication).

The IDU status in the *EHIF dataset* was defined using ICD-10 classification codes standing for opiates use. According to the existing data, opioides (home-made opioides, heroin or fentanyl/analogues) are the main group of illicit drug used by IDUs in Estonia, and their use by other means of administration than injecting is extremely rare. In the cross-sectional study of 450 current IDUs, 80.1% of the respondents reported opioids use (Uusküla A. Study report, NIHD/GF). Of note, our IDU definition applied at the data abstraction from EHIF might lead to underestimation of the actual numbers of IDU, as proportion of IDUs reporting amphetamines use is growing in Estonia (Abel K, 2005). For abstraction from the *HIV reference laboratory dataset* IDUs were defined as those tested for HIV under the 'Drug user' category (#102). Based on the expert opinion, it is reasonable to assume that overwhelming majority of those tested under this category were actual IDUs. Of course, there is a potential for major underreporting of IDU status based on HIV reference laboratory data, as substantial proportion of actual IDUs are categorized under the other categories, such as 114 (anonymous testing) and 112 (persons held in the custody in prison).

Independent of method used for "capture", several key criteria must be met. Firstly, the assumption that each member of the population should have an equal, non-zero probability of being "captured" might be violated. Several possible entry points provide preferential access to one subset of IDUs to another. Significant proportion of IDUs (54,7% according to the data from cross-sectional RSD sample of 450 IDUs) has virtually no chance at all to end up in the EHIF drug treatment dataset. However, the chance of IDUs ending up in the EHIF 'overdose' dataset might be equally distributed, as emergency care is free and covered for everyone in need according to the health regulations in Estonia. Unemployed IDUs might be more likely to be arrested or incarcerated, and there might be important geographic variations (i.e. unemployment is higher in Ida-Virumaa County). Secondly, the individuals identified in captures must be correctly identified as recaptures, and no one else should be identified as a recapture. The quality and reliability of the data provided by the three administrative data sources was discussed above. We assume that six identifiers (gender, day/month/year of birth, and initials) we used were sufficient to provide true match. Thirdly, there should be no major in-migration or out-migration from the population between the initial and the second captures (Hook EB, 1995). We have reason to assume that current IDU population itself is not changing rapidly. It is believed that the early phase of IDU epidemic in Estonia occurred during the second half on 1990s (Kalikova N, 2003). Additionally, it is well documented that opiate users (IDU) progress through drug using career and start and stop using drugs several times during their career (6 times in average for the sample of 450 IDUs from the cross-sectional study). Still, considering relatively short timeframe of sampling for the current analysis, we can confidentially assume that this precondition is not violated. Lastly, samples must be independent from one another, not correlated. We observed pair-

wise positive correlation between datasets, which can lead to an underestimate of the true population size, because it will increase the number of double captures and therefore the size of denominator for the population size calculation. In the current study, using four samples – police, two EHIF and HIV reference laboratory data sets – reduces the importance of independence.

Multiplier method

The multipliers collected through cross-sectional study on HIV/risk behaviour prevalence that used respondent driven sampling methodology gave implausible results. Historically mortality multipliers have been used to estimate the prevalence of problem drug use. Unfortunately, due to the absence of drug related death data on 2004 we were unable to perform this exercise. Similar study in Togliatti, Russia used multipliers and CRC techniques for IDU estimation, and according to their findings multiplier approach was inferior to the CRC: multiplier estimates combining data from the community-recruited survey (Rhodes T, 2002) and local benchmarks failed to generate any credible estimates (Platt L, 2004). Hickman M et al (in press) concluded after comparison of multiplier and capture-recapture (CRC) methods of estimating prevalence of injecting drug use (IDU) in four cities (Brighton, Liverpool, London, and Togliatti) that almost all of the individual comparisons the multiplier estimates performed poorly, and CRC methods should be preferred as the means of estimating numbers of drug users with multiplier methods being used with caution and only where CRC is not possible.

IDU and HIV prevalence

Regardless of whether or not our estimates are an underestimate of true IDU prevalence, estimated IDU prevalence in Estonia is high. The total number of IDUs was estimated to be 13801 (range 8178-34732) giving us the population prevalence of 2.4 % (range 1.4%-6.0%) for the population aged 15-44. Comparable study in Togliatti estimated that 2.7% of the population aged 15-44 are IDUs (Platt L, 2004). According to the estimated numbers of IDUs there are important differences in IDU prevalence within the country: with the highest IDU prevalence in capital area (4.2%) followed by Ida-Virumaa county (3.4%), and low IDU prevalence throughout the rest of Estonia (0.4%).

According to our estimations there are potentially 8533 (range 5068-21503) HIV infections associated with IDU throughout the country, representing 1.5% (range 0.9-3.7%) of the population aged 15-44 in Estonia.

HIV prevention coverage

It is hard to assess coverage of IDU population with harm reduction services due to the lack of relevant data. Therefore the coverage estimates with the SEP services might be erroneous. Nevertheless, there is an obvious need to enhance and sustain the levels of syringe exchange services. The costs for optimum coverage (60% of the population as recommended by UNAIDS) need to be accounted for. Clearly, the estimated coverage with methadone treatment for opioid dependence is low, and calls for expanding access to and combining with counseling, developing vocational skills, and/or provide psychosocial and medical support services to rehabilitate patients. Still, it is vital to estimate the cost and sustainability of services based on the patient load they can safely and responsibly maintain.

HIV / IDU monitoring needs

The results of this study, as well problems accounted, underline the need of well designed and coordinated efforts for surveillance and monitoring of HIV/ risk behavior / size in sub-populations of interest both at the national and local levels. This includes – but is not limited to – good institutional record-keeping as well as usage of clear, consistent pre-determined definitions for time reference period and populations under review. Developing comprehensive information systems for assessing and evaluating the dynamics in HIV and risk behavior dynamics in is needed for informed decision making.

THE LIST OF TABLES AND FIGURES

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APPENDIX 1.

POLITSEIAMET

Pärnu mnt 139

Tallinn, 15060

V.a. Marilis Sepp ja Karin Mumm 26. juuli 2005

Tartu Ülikool koostöös Londoni Ülikooli Imperial College ja Tervise Arengu Instituudiga teostab uurimistööd „Süstivad narkomaanid Eesti Vabariigis – HIV levimus ja rahvastikurühma suurus“.

Põhimõttelise nõusoleku koostööks Politseiametiga süstivate narkomaanide rahvastikurühma suurust hindavaks uuringus saime käesoleva aasta mai kuus. Nüüd soovime uuringuga edasi minna ja pöördume Politseiameti poole teie andmebaasidest uuringuks vajaliku välja võtte saamiseks.

Tahan veel kord rõhutada, et me ei vaja isikut üheselt tuvastada võimaldavat infot, samuti ei vaja juurdepääsu Teie poolt hallatavatele andmetele. Uuringu korrektse läbiviimise kindlustamiseks on uuringu kavand läbivaadatud Eesti Andmekaitse inspektsioonis ning lisatud on Tartu Ülikooli Inimuuringute Eetikakomitee nõusolek uuringu läbiviimiseks.

Vajame järgmiste paameetritega väljavõtet Politseiameti andmebaasist:
1) Narkosüüteod, mille puhul on rakendatud järgnevaid paragrahve:
01.01.2002-30.09.2002 paragrahvid KrK 202.5, lg1, HÕS 158, lg1;
alates 30.08.2002 kuni 2005 NPS 15.1
Soovime teada:
2) karistusaluse isiku eesnime esimene täht
3) perekonnanime esimene täht
4) sugu
5) sünnipäev/kuu/aasta
6) eelpool mainitud paragrahvi isikule rakendamise kuupäev/kuu/aasta
7) piirkond (maakond)

Loodame, et uuringuks vajaliku väljavõtte Teie poolt hallatavatest andmebaasidest teostab teie andmebaasi volitatud töötaja ning meie omalt poolt katame lisaülesande täitmisega seotud kulud (tööaeg jm.).

Hea meelega vastan täiendavatele küsimustele.

Lugupidamisega,

Anneli Uusküla, MD, MS, PhD
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APPENDIX 2.

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Tartu Ülikool koostöös Londoni Ülikooli Imperial College ja Tervise Arengu Instituudiga teostab uurimistööd „Süstivad narkomaanid Eesti Vabariigis – HIV levimus ja rahvastikurühma suurus“.

Põhimõttelise nõusoleku koostööks Eesti Haigekassaga hindamaks süstivate narkomaanide rahvastikurühma suurust saime 06. mail 2005.a. Nüüd soovime uuringuga edasi minna ja pöördume Eesti Haigekassa poole teie andmebaasidest uuringuks vajaliku välja võtte saamiseks.

Tahan veel kord rõhutada, et me ei vaja isikut üheselt tuvastada võimaldavat infot, samuti ei vaja juurdepääsu Teie poolt hallatavatele andmetele. Uuringu korrektse läbiviimise kindlustamiseks on uuringu kavand läbivaadatud Eesti Andmekaitse inspektsioonis ning lisatud on Tartu Ülikooli Inimuuringute Eetikakomitee nõusolek uuringu läbiviimiseks.

Vajama järgmiste paameetritega väljavõtet Eesti Haigekassa raviarvete andmebaasist:

1) aastad 1997 (2000) kuni 2004 (kaasa arvatud);
2) raviarved diagnoosi koodidega: T40.0, T40.1, T40.2, F11.0 kuni F11.9.;
3) ravialuse eesnime esimene täht;
4) ravialuse perekonna nime esimene täht;
5) ravialuse sugu;
6) ravialuse sünnipäev/kuu/aasta;
7) Raviarve väljastanud arsti/meditsiini asutuse piirkond (maakond);
8) raviarve väljastamise kuupäev/kuu/aasta;
9) ravialuse ID (identifitseerida mitte võimaldav).

Hea meelega vastan täiendavatele küsimustele.

Lugupidamisega,

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APPENDIX 3.

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Paldiski mnt 68, Tallinn 10617

V.a. Valentina Ustina 26. juuli 2005

Tartu Ülikool koostöös Londoni Ülikooli Imperial College ja Tervise Arengu Instituudiga teostab uurimistööd „Süstivad narkomaanid Eesti Vabariigis – HIV levimus ja rahvastikurühma suurus“.

Põhimõttelise nõusoleku koostööks HIV referenslaboriga süstivate narkomaanide rahvastikurühma suurust määravas uuringus saime käesoleva aasta mai kuus.
Nüüd soovime uuringuga edasi minna ja pöördume HIV referents labori poole teie andmebaasidest uuringuks vajaliku välja võtte saamiseks.
T
Tahan veel kord rõhutada, et me ei vaja isikut üheselt tuvastada võimaldavat infot, samuti ei vaja juurdepääsu Teie poolt hallatavatele andmetele. Uuringu korrektse läbiviimise kindlustamiseks on uuringu kavand läbivaadatud Eesti Andmekaitse inspektsioonis ning lisatud on Tartu Ülikooli Inimuuringute Eetikakomitee nõusolek uuringu läbiviimiseks.

Vajame järgmiseid andmeid aastatel 1997 kuni 2004 (kaasa arvatud) HIV infektsiooni suhtes koodide 102 ja 112 all testitute osas:

10) testitu eesnime esimene täht;
11) testitu perekonnanime esimene täht;
12) testitu sugu;
13) testitu sünnipäev/kuu/aasta;
14) piirkond (maakond), kust test uuringule saadeti;
15) testimise kuupäev/kuu/aasta;

Loodame, et uuringuks vajaliku väljavõtte Teie poolt hallatavatest andmebaasidest teostab teie andmebaasi volitatud töötaja ning meie omalt poolt katame lisaülesande täitmisega seotud kulud (tööaeg jm.).
Hea meelega vastan täiendavatele küsimustele.

Lugupidamisega,

Anneli Uusküla, MD, MS, PhD
Vastutav uurija

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APPENDIX 4. HIV testing categories and distribution of HIV + cases between these categories in 2004.

Testing category		N	%
Sexual contacts of HIV +	101	4	0,5
Drug addicts	102	30	4,0
STD patients	104	5	0,7
Women undergoing abortion	107	13	1,7
Blood/organ donors	110	11	1,5
Pregnant women	109	58	7,8
Prisones	112	163	21,9
On clinical indication	113	113	15,2
Anonymous testing	114	238	32,0
Prophylactic testing	116	75	10,1
On epidemiological indcations	118	31	4,2
Other		2	0,3
Total		743	

APPENDIX 5. Multiplier questionnaire.

KÕIKI NEID KÜSIMUSI ESITATAKSE KINDLA AJAVAHEMIKU KOHTA PEAMISELT
2004. AASTA (JAANUAR 2004-DETSEMBER 2004)
PALUN PIDAGE SEDA MEELES JA MÕELGE HOOLIKALT, ENNE KUI VASTATE.

QM	01	Intervjueerija nime algustähed ☐☐		
QM	02	Intervjuu kuupäev ☐☐ Päev ☐☐ Kuu ☐☐☐☐ Aasta		
QM	03	Uuritava sünnikuupäev ☐☐ Päev ☐☐ Kuu ☐☐☐☐ Aasta		
QM	04	Sugu (täidab küsitleja) Mees 1 Naine 2		
QM	05	Uuritava nime algustähed ☐☐		
QM	06	Kas elasite 2004. aastal Eestis? JAH 1 Ei tea =88, Ei vasta =99 Ei 0	→	LÕPP
QM	07	Kui mitu kuud elasite 2004. aastal Eestis?		
	a	Tallinn JAH Ei Kui mitu kuud? ☐☐		
	b	Kohtla Järve JAH Ei Kui mitu kuud? ☐☐		
	c	Mujal Palun täpsustage ..... Kui mitu kuud? ☐☐		
QM	08	Mis tänaval elasite? Tänava nimi ..... Vastus puudub 9		
QM	09	Kas Teile tehti 2004. aastal HIV test? JAH 1 Ei tea=88, Ei vasta=99 Ei 0	→	QM13
QM	10	Kas 2004. aastal oli Teie HIV testi tulemus positiivne? JAH 1 Ei tea=88, Ei vasta=99 Ei 0	→	QM13
QM	11	Mis kuul oli Teie HIV testi tulemus positiivne? Kuu ☐☐		
QM	12	Kas Te 2004. aastal, kui teglte positiivse tulemuse saanud HIV testi ütlesite, et kasutate narkootikume? JAH 1 Ei tea=88, Ei vasta=99 Ei 0		
QM	13	Kas Teid vahistati 2004. aastal ja hoiti mõnes politseijaskonnas vahi all? JAH 1 Ei 0 Ei tea=88, Ei vasta=99	→	QM17
QM	14	Kui mitu korda Teid 2004. aastal arreteeriti ja politseijaoskonnas vahi all hoiti? Kordade arv ☐☐		

QM	15	**Kui mitu korda oli arreteerimise ja vahi all hoidmise põhjuseks heroiini või mõne muu süstitava narkootilise aine omamine või tarnimine?** Kordade arv ☐☐		
QM	16	**Millal Teid arreteeriti ja hoiti vahi all heroiini või mõne muu süstitava narkootilise aine omamise või tarnimise eest?** Kuu ☐☐ Kuu ☐☐ Kuu ☐☐		
QM	17	**Kas vajasite sel ajaperioodil narkootilise aine üledoosi tõttu ka esmaabi?** JAH 1 Ei tea=88, Ei vasta=99 Ei 0 →		QM18
	a	**Sündmuskohal (tänaval, kodus, jne)** JAH Ei Kui mitmel korral? ☐☐ Järgmistel kuudel ☐☐ ☐☐ ☐☐ Seoses narkootilise aine süstimisega JAH Ei JAH Ei JAH Ei		
	b	**Erakorralise meditsiini osakonnas** JAH Ei Kui mitmel korral? ☐☐ Järgmistel kuudel ☐☐ ☐☐ ☐☐ Seoses narkootilise aine süstimisega JAH Ei JAH Ei JAH Ei ..... halgia erakorralise meditsiini osakonnas		
QM	18	**Kas Teid võeti 2004. aastal psüühikahäirete või käitumishäirete tõttu ravile mõnda psühhiaatriakliinikusse või polikliinikusse?** JAH 1 Ei 0 → Ei tea=88, Ei vasta=99		LÕPP
QM	19	**Millal Sind võeti psüühika- või käitumishäirete tõttu ravile mõnda psühhiaatriakliinikusse või polikliinikusse?** Kuu ☐☐ Kuu ☐☐ Kuu ☐☐		
QM	20	**Millisesse psühhiaatriakliinikusse või polikliinikusse Teid psüühika- või käitumishäirete tõttu ravile võeti?** Täpsustage ..... Täpsustage		

APPENDIX 6. Population of Estonia, 01.01.2004.

		Total	15-19	20-24	25-29	30-34	35-39	40-44	15-44
Whole country	Total	1351069	107182	100566	93415	94066	87975	97464	580668
	Males	622450	54681	51243	47011	46746	42759	46599	289039
	Females	728619	52501	49323	46404	47320	45216	50865	291629
Harju County	Total	521410	38584	40172	43073	40011	34733	38007	234580
	Males	239105	19680	20376	21736	20014	17076	17814	116696
	Females	282305	18904	19796	21337	19997	17657	20193	117884
Ida-Viru County	Total	174809	14450	12260	10536	10860	10593	13866	72565
	Males	78549	7369	6319	5244	5264	4939	6466	35601
	Females	96260	7081	5941	5292	5596	5654	7400	36964

APPENDIX 7. Model characteristics for capture-recapture analysis.

Model (all)	CI1	Estimate	CI2	ll(model)	df	AIC	BIC	Deviance
d1 d2 d3 d4	3535,73	6270,71	10124,89	-71,46	5	152,93	156,47	73,14
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d2*d4 d3*d4	9198,44	15196,94	39899,88	-36,44	11	6,32	-7,75	3,08
d1 d2 d3 d4 d1*d3 d1*d4 d2*d3 d2*d4 d3*d4	6897,75	12665,12	28781,86	-36,89	10	6,25	-9,56	3,98
d1 d2 d3 d4 d1*d2 d1*d4 d2*d3 d2*d4 d3*d4	6602,70	9719,22	24102,57	-47,74	10	7,70	12,14	25,68
d1 d2 d3 d4 d1*d2 d1*d3 d2*d3 d2*d4 d3*d4	8260,55	12570,32	33715,81	-49,86	10	7,98	16,38	29,92
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d4 d3*d4	3759,12	6751,27	11394,27	-42,71	10	7,03	2,08	15,62
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d3*d4	4351,13	7033,16	13026,14	-43,85	10	7,18	4,37	17,91
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d2*d4	8298,76	12457,38	33855,98	-45,36	10	7,38	7,39	20,93
Model (men)								
d1 d2 d3 d4	3056,22	5215,47	8402,96	-66,02	5	9,47	40,68	67,76
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d2*d4 d3*d4	10843,62	16480,46	50699,88	-33,82	11	5,96	-7,49	3,35
d1 d2 d3 d4 d1*d3 d1*d4 d2*d3 d2*d4 d3*d4	7119,18	12386,93	30599,77	-34,42	10	5,92	-8,98	4,56
d1 d2 d3 d4 d1*d2 d1*d4 d2*d3 d2*d4 d3*d4	7292,39	10204,54	30104,17	-43,46	10	7,13	9,10	22,64
d1 d2 d3 d4 d1*d2 d1*d3 d2*d3 d2*d4 d3*d4	9949,30	14178,72	45921,09	-45,98	10	7,46	14,13	27,67
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d4 d3*d4	3280,14	5713,25	9717,27	-40,50	10	6,73	3,17	16,71
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d3*d4	3609,61	5402,97	9808,97	-43,81	10	7,17	9,79	23,33
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d2*d4	11343,19	16265,75	54248,30	-39,37	10	6,58	0,91	14,45
Model (women)								
d1 d2 d3 d4	597,90	969,74	1747,40	-31,73	5	4,90	-11,10	15,98
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d2*d4 d3*d4	1378,97	1691,78	6765,22	-26,04	11	4,94	-6,23	4,60
d1 d2 d3 d4 d1*d3 d1*d4 d2*d3 d2*d4 d3*d4	1059,12	1413,64	4131,76	-26,16	10	4,82	-8,70	4,85
d1 d2 d3 d4 d1*d2 d1*d4 d2*d3 d2*d4 d3*d4	937,28	1087,87	3944,50	-27,72	10	5,03	-5,57	7,97
d1 d2 d3 d4 d1*d2 d1*d3 d2*d3 d2*d4 d3*d4	1117,19	1307,75	5332,36	-27,61	10	5,01	-5,80	7,74
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d4 d3*d4	635,00	971,63	1836,69	-26,79	10	4,91	-7,43	6,11
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d3*d4	1219,84	1687,25	5058,25	-26,04	10	4,81	-8,94	4,60
d1 d2 d3 d4 d1*d2 d1*d3 d1*d4 d2*d3 d2*d4	790,84	922,29	2751,04	-28,08	10	5,08	-4,85	8,69

d1 = HIV reference laboratory; d2 = police arrest data; d3 = HIF treatment; HIF overdoses

APPENDIX 8.

STUDY PROTOCOL TO ESTIMATE THE PREVALENCE OF INJECTING DRUG USERS IN MOSCOW, VOLGOGRAD AND BARNAUL

Why estimate?
Estimating the prevalence of injecting drug users can be used for several reasons. It can be used to enable more effective policy making and for allocating resources for control of drug use, treatment and prevention. It is also integral in assessing what coverage drug services are achieving of drug using population for monitoring purposes.

It is not possible to estimate population size of hard to reach groups such as injecting drug users by traditional population surveys, but it is possible using indirect methods such as multiplier or nomination techniques or capture-recapture technique.

Capture-Recapture
This works by taking 3 or more data sources of problem drug users and identify a number of matches between data sources. Matches could be date of birth, name, sex, address. The proportion of matches within the data sources is used to estimate the hidden population. The method assumes that the proportion of subjects captured in two or more samples equals the proportion of the total population sampled in the study.

Multiplier or nomination technique
Take a sample of problem drug users and estimate the proportion experiencing a specific phenomenon (X) (i.e. overdose). This is called a multiplier.
Take a separate record of number who experienced X, this is called a benchmark. Benchmarks could be the number in treatment, drug-related deaths, arrest or overdoses. The benchmark is divided by the multiplier to give the population estimate. For this method we only use total numbers of people in a particular data source without individual identification.

Our objectives
Imperial College propose estimating the number of injecting drug uses in Moscow, Volgograd and Barnaul.

Firstly we need to evaluate the feasibility of carrying this out with the data sources currently used in each city.

Multiplier questions were included in the survey of HIV prevalence and injecting and sexual risk behaviour among community –recruited injection drug users in each city conducted in Autumn 2003, which will help us

QUESTIONS ON DATA SOURCES

Definition
We want to estimate injecting drug use. Which data sources record injecting status, which data sources record problem drug use where it can be assumed they are injectors?
During the training course held in March 2003 on Behavioural Research Methods, we defined potential data sources that could be used in each city. The potential data sources are as follows:

Неотложная нарколог. помощь (токсилогич. центр)
отд. Неотл. Н. Помощь
Краевой противо ТВ Диспансер

Судебно-медицинское бюро
Перинагальный центр/+ + род,. дома/консульт.?
Гепатологический центр (Hepatitis Centre)
Пош?
Скорая помощь
Служба крови
УИН + ПИН по прин. леч./ СИВО (?) (следственные издатели)
УИН – Управление Исполнение Наказание

We need to decide which data source can be used. Below is a list of data that we require from each data source and some questions that we need to ask when assessing the data sources. These will help us decide which sources to use:

Data to be requested from the records

- Client initials (essential)
- Full date of birth (essential)
- Sex (essential)
- Drug (optional)
- Injecting Drug User or marker for IDU (essential)
- Area of residence (essential)
- Sex worker (for women) (optional)

General questions for each data source:
Over what time period do they cover?
What information is recorded in the data set?
What form are the data available in?
How do we get permission to access the data? What is the protocol for gaining permission?
What estimate would the agency make of the number of individuals held on its database who are injecting drug users?
What definition(s) are used for drug use/problem drug use/injecting drug use in the data source?
How are the data sources connected to each other if at all?
Are the data anonymised?
Where there is more than one site (e.g. prisons), is the data centralised and if so over what area(s)?
What is the likelihood of underreporting? For example with narcology records can an individual pay more and be kept off the register?

Time period
We need to collect data on all IDUs that have contact with the service between 1st January 2003 to 31st December 2003. This includes first time contacts and repeat contacts, as long as they remain active IDUs at the point of contact.

Timetable

Below is a timetable of activities. The timetable for data collection has been scheduled to coincide with a field trip to each site by a member of the behavioural research team who will advise the assessment of data entry forms and set up a data entry programme is necessary.

Finalise and agree protocols and contracts with Russia based collaborators	November 04
Data collection in Barnaul	November 04
Data collection in Moscow	November 04

Data collection in Volgograd	January 05
Data entry and cleaning in Barnaul	November to December 04
Data entry and cleaning in Moscow	November to December 04
Data entry and cleaning in Volgograd	January to March 05
Analysis – Volgogad and Barnaul	April 05
Report writing	May 05
Publication writing	May to June 05
Dissemination of results	August 05

Analysis

We propose that a 3-day meeting will take place in Moscow in April 2005 for one researcher from each site to participate in. During the meeting we will analyse the datasets using covariate capture recapture techniques to gain estimates of the IDU population.

~~In brief the covariate capture recapture analysis will include:~~

- ~~Fitting poisson regression models to the observed data~~
- ~~Fitting interactions between data sources fitted to replicate "dependencies" between those data sources.~~
- Covariate capture-recapture will be used to adjust for heterogeneity within a single model. This involves fitting covariates (such as age-group, sex, area of residence).
- The best models are selected based on the goodness of fit "G2" (the deviance between observed and expected values), which are approximated by chi squared distribution.

The multiplier method does not require any statistical package to analyse as it merely involves dividing the benchmark by the multiplier. This method has recently been shown to be less reliable but will used for purposes of comparison with the covariate capture recapture estimate. The data requirements for the multiplier are only the total number of IDUs that have been in touch with the following organisations during 2003:

1. AIDS Centre
2. Accident and Emergency
3. Detained under Article 228 by the police
4. Registered at Narcology Service as an IDU