

# **The need for a global understanding of epidemiological data to inform human immunodeficiency virus (HIV) prevention among injecting drug users**

---

**K. L. DEHNE**

*Joint United Nations Programme on HIV/AIDS, Vienna*

**M. ADELEKAN**

*United Nations Office on Drugs and Crime, Vienna*

**A. CHATTERJEE**

*Joint United Nations Programme on HIV/AIDS, Bangkok*

**G. WEILER**

*World Health Organization, Geneva, Switzerland*

## **ABSTRACT**

*Since the 1980s, the injecting of illicit drugs, especially opiates, cocaine and amphetamines, has become a worldwide epidemic, affecting more than 150 countries. Because many injecting drug users (IDUs) share injecting equipment with other IDUs, they are at very high risk of contracting human immunodeficiency virus (HIV) and other blood-borne infections. Using case examples from Asia, Eastern Europe and Africa, we show that only a fraction of the data required to monitor HIV prevention among IDUs is effectively collected.*

*In Asia, considerable work has been done to estimate the size of drug-injecting populations and measure risk behaviours. A few HIV prevalence surveys have also been carried out. In Eastern Europe and the countries of the former Union of Soviet Socialist Republics, the focus of attention has been on the monitoring of service reach and the establishing of infection rates among those seeking services, while reliable estimates of the number of IDUs at risk and, therefore, the proportion of IDUs reached by services, are lacking. In Africa, the main purpose of specific data collection has been to establish the existence of a significant drug-injecting problem.*

*For a comprehensive understanding of the HIV epidemics among IDUs and of the efforts to prevent them, however, all three types of data, on the size and pattern of drug injecting, on service provision and on programme impact, including on risk behaviours and HIV prevalence and incidence, need to be systematically collected. In particular, the monitoring of the coverage of treatment and prevention services for*

*IDUs has so far been neglected. In order to improve data collection for HIV prevention among IDUs, therefore, an effort is required that goes beyond individual geographical locations, sectors and disciplines.*

*Keywords:* injecting drug use; HIV prevention; population size estimation; behavioural surveillance; response monitoring; coverage; HIV prevalence.

---

## **Introduction**

Since the 1980s, the injecting of illicit drugs, especially opiates, cocaine and amphetamines, has become a worldwide epidemic, affecting perhaps 10 million people in more than 130 countries, most of them young people between the ages of 15 and 30 [1]. For most cities, countries and regions worldwide, no reliable estimates of the number of injecting drug users (IDUs) exist, however, and those figures relating to the extent and pattern of drug injecting and their trends that are available are often the "guesstimates" of ministry of interior or ministry of health officials rather than the results of research or systematic surveillance. The present article aims to provide examples of recent initiatives to improve the accuracy of IDU estimates in several world regions.

Because many drug injectors share injecting equipment with other IDUs, they are at very high risk of contracting HIV and other blood-borne infections. For example, very rapid increases in HIV prevalence among IDUs, from less than 5 per cent to over 30 or 50 per cent within one to three years, have been reported in cities in Belarus, India, Myanmar, the Russian Federation, Thailand, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America, among others [2]. Significant epidemics among drug users leading to several thousand infections among IDUs have also been reported from countries and regions such as China, Malaysia, Southern Europe and parts of Latin America, where IDUs account for a large proportion of all HIV cases [2], although the real extent of those epidemics is rarely clear. Both the extent to which drug-using populations engage in risk behaviours, including sharing non-sterile injecting equipment and practising unsafe sex, and the levels of IDUs infected with HIV are of obvious relevance to HIV prevention efforts.

Furthermore, there is evidence from several sites that HIV epidemics among drug users can be prevented or stabilized through the implementation of appropriate public health policies and early interventions and therefore data on programmes and service provision are also needed [3]. These public health interventions and the policies that allow for their implementation mainly relate to two types of service: drug dependency treatment and HIV prevention services, including outreach and the provision of information and safe injecting equipment for those not in treatment. A recent review of the impact of drug dependency treatment on HIV risk behaviours and infection rates showed that all standard opiate dependency treatment modalities have the potential to reduce street heroin injecting, the sharing of non-sterile injecting equipment and consequently the

transmission of HIV [4]. Retention in treatment and treatment progress (quality of the treatment), rather than simply time spent in treatment, were found to be predictors of risk reduction, and substitution treatment such as methadone maintenance was more effective than detoxification and psychosocial counselling alone [4]. There is also significant evidence that service packages comprised of (peer) outreach, risk-reduction counselling and needle exchange programmes can be effective in modifying risk behaviours and preventing HIV infections [5].

Three types of data therefore appear to be required in order to be able to monitor progress in HIV prevention programming comprehensively: (a) data on the size and geographical location of drug-injecting populations, including on the types and patterns of drugs injected (regular drug users' injecting frequency differs according to whether opiates, cocaine or amphetamines are being injected); (b) data on service provision (for example, treatment demand and needle exchange programme enrolment); and (c) data on the impact or outcome of prevention (and care) programmes, including on risk behaviours (for example, rates of equipment-sharing), HIV prevalence and incidence.

As the following case examples from Asia, Eastern Europe and Africa show, only a fraction of those data tend to be routinely and consistently collected in the more than 130 countries known to have a drug-injecting problem and, even where most of these data are collected, they are not necessarily compiled and analysed across services, sectors and cities or utilized for joint planning and programming.

### **Efforts to estimate the size of drug-injecting populations and to measure HIV risk behaviours among injecting drug users in Asia**

In Asia, considerable work has been done on estimating the size of drug-injecting populations and measuring risk behaviours. Some service statistics, such as drug dependency treatment, are also available. Various national- or state-level agencies have been involved in various types of data collection. For example, public health and social welfare agencies have used traditional surveys and indirect methods of estimation. In the absence of good secondary data, street-based surveys of drug users have been carried out and extrapolation techniques have been used. Law enforcement-focused drug control agencies in Asia have used police surveillance in communities as data sources and as a starting point for the estimation of IDU population size. However, the statistics available do not always distinguish between injectors and non-injectors. Establishing the successful coordination of data collection efforts and a common understanding of the methodology and purpose across sectors remains a challenge in most countries of Asia.

Table 1 lists some of the methods used to estimate the size of the IDU populations in Asian countries, the appropriateness of which was reviewed by various agencies and experts at a workshop held recently in Indonesia. The Global Assessment Programme on Drug Abuse of the United Nations International Drug Control Programme is currently developing a methodological tool kit to support

the application of indirect estimation techniques [6]. The tool kit provides an overview of the different estimation procedures and provides practical guidelines for their implementation, including for their application in developing countries.

**Table 1. Methods of estimating the size of the drug-using and other vulnerable populations in Asia**

Method	Country
National household survey	India
Multiplication and capture-recapture from treatment centre and other data	Iran (Islamic Republic of), Pakistan, Thailand
National drug-testing register (for example, compulsory drug screening for driving-, marriage- or trade-lisence applicants)	Iran (Islamic Republic of)
Street-based enumeration and extrapolation at the city and state levels	Bangladesh, India
Police surveillance in communities	China, Myanmar

*Sources:* United Nations International Drug Control Programme, Regional Office for South Asia, New Delhi; national drug control agencies in China and Myanmar; T. D. Mastro and others, "Estimating the number of HIV-infected injection drug users in Bangkok: a capture-recapture method", *American Journal of Public Health*, vol. 84, 1994, pp. 1094-1099; E. Razzaghi and others, *A Rapid Assessment of Drug Abuse in Iran* (United Nations International Drug Control Programme, Tehran, 1999); Co-operative for American Remittances to Europe (CARE), Bangladesh, *Drug Injecting and Potential for Continuing Spread of AIDS: A Baseline Assessment in Dhaka City* (May 1998); S. Sarkar and others, "Rapid spread of HIV among injecting drug users in north-eastern states of India", *Bulletin on Narcotics*, vol. XLV, No. 1 (1993), pp. 91-105.

City estimates are usually more readily available than state-, province- or national-level estimates, and national estimates developed from incomplete lower-level data are unreliable. Nevertheless, the results of all those studies combine with less systematic data collection efforts by ministries of health and drug control agencies to suggest that the number of drug injectors living in South and East Asian countries may be large, ranging from around 20,000 in Nepal and 25,000 in Bangladesh to 70,000-200,000 in the Islamic Republic of Iran, 200,000 in Malaysia, 150,000-300,000 in Myanmar and 600,000 to 1 million in China [6].

Studies of HIV risk behaviours among drug-injecting populations have also multiplied in Asia in recent years. Several countries have now included IDUs as a risk group in their national HIV behavioural surveillance (for example, Bangladesh [7], India [8], Indonesia and Viet Nam). In many of those national behavioural surveillance studies, sampling has considerably varied over time, however, from purposive to more random and representative. Risk behaviours have generally been described as frequent, with needle or syringe sharing rates among IDUs ranging from 30 to over 90 per cent, depending on the indicator and reference period used. However, variable data quality, the absence of trend data and the lack of

**Table 2. Selected risk indicators among 515 male drug injectors in urban Dhaka**

<i>Indicator definition</i>	<i>Time reference</i>	<i>Indicator</i>
Mean age at first injection		20
Mean length of years injecting		12.3
Most common drug injected		Tidjesic
Percentage using previously used needle or syringe	Last week	81.4
Percentage using previously used needle or syringe	Last month	87.4
Percentage passing on needle and syringe	Last week	76.1
Percentage passing on needle and syringe	Last month	79.0
Percentage having professional injection	Last week	3.5
Percentage having professional injection	Last month	5.2
Percentage sharing needles or syringes active or passive	Last week	93.4
Percentage sharing needles or syringes active or passive	Last month	94.2
Mean number of injections	Last week	14.6
Mean number of injections	Last month	59.5
Mean number of people sharing	Last sharing event	3
Percentage buying sex from any commercial partner	Last month	32.6
Percentage buying sex from any commercial partner	Last year	57.9
Percentage using condom at last paid sex	Last time	21.1
Percentage selling sex to any commercial partner	Last year	5.2
Percentage having participated in needle or syringe exchange	Ever	30.9

*Source:* Family Health International, Bangkok, 2002.

comparability owing to definitional problems over what constitutes "sharing" have been common problems.

From some sites, such as Dhaka, the results of several rounds of cross-sectional behavioural surveys among drug injectors are available, as well as data on a variety of risk indicators (see table 2).

As mentioned above, HIV prevalence surveys have also been carried out among IDUs in Asian countries. For example, in Mandalay, Myanmar, in 2000, 63 per cent of IDUs were found to be already infected and in Thailand recent surveys have shown infection rates of approximately 50 per cent. In both China and India, HIV prevalence rates have varied from less than 5 per cent to 80 per cent in different sites [9].

By contrast, there is little systematic collection of data on HIV prevention service delivery for IDUs in the Asian region, partially because there are so few services. In most Asian cities, only a small minority of IDUs has access to either needle and/or syringe exchange or quality drug-dependency treatment. Exceptions are Bangkok [10] and Hong Kong Special Administrative Region of China [11], where a significant proportion of IDUs are enrolled in methadone maintenance programmes.

**Table 3. HIV prevalence among injecting drug users in Eastern Europe, selected studies**

Place	Year	Characteristics	Sample size	HIV prevalence (percentage)
Ukraine				
Poltava	2000	Needle and/or syringe exchange	259	42.1
Odessa	2001	Needle and/or syringe exchange	250	68.0
Kharkiv	2000	Needle and/or syringe exchange	250	17.6
Kryvyi Rig	1999	Needle and/or syringe exchange	249	28.1
Russian Federation				
St. Petersburg	2001	Needle and/or syringe exchange	252	35.7
St. Petersburg	2000	Survey of prison inmates	9 727	46.0
Novosibirsk	2000	IDUs seeking care	239	5.9
Rostov-na-Donu	2001	Needle and/or syringe exchange	255	33.3
Belarus				
Svetlogorsk	2000	IDUs seeking care	250	74.0
Minsk	2000	IDUs seeking care	224	22.3
Mogilev	2000	IDUs seeking care	224	1.8
Vitebsk	2000	IDUs seeking care	154	0.0
Kazakhstan	1999/2000	Registered IDUs	21 013	0.5
Temirtau	2000	Needle and/or syringe exchange	415	26.0

Sources: Ministries of Health of Belarus and Ukraine; K. L. Dehne, "HIV among IDUs and the extent of heterosexual spread in Eastern Europe", *Global Research Network Meeting on HIV Prevention in Drug-Using Populations, Fourth Annual General Meeting*, Melbourne, Australia, October 2001 (National Institute on Drug Abuse, Baltimore, Maryland, United States of America, 2001).

### **Programme indicator development in Eastern Europe**

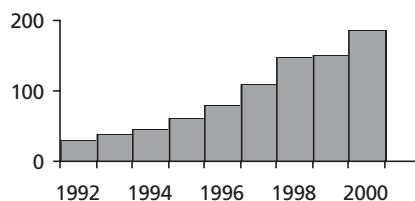
In Eastern Europe and in the countries of the former Union of Soviet Socialist Republics, the focus of attention has not been on the estimation of the number of drug injectors, but on the monitoring of service reach and the establishing of infection rates among those attending services. In some countries, routine HIV testing of illicit drug users seeking treatment and upon arrest also continues.

More than 150 outreach or needle exchange projects exist in the subregion, virtually all established since the first outbreaks of HIV occurred among IDUs in that region in the mid-1990s [12]. In some of those sites, HIV prevalence surveys have been conducted among service attenders or from the residual blood of discarded syringes, or both. The results of recent survey rounds are shown in table 3.

In recent years, the measurement of service reach has drawn increasing attention. The various outreach or needle and/or syringe exchange programmes serve from under one hundred to several thousand IDUs and some projects routinely monitor not only the absolute number of client visits, for example, during the previous month, but also retention (repeat visits by individual clients) and the number of needles and syringes exchanged [13]. A number of behavioural studies among opiate injectors are also under way.

Drug dependency treatment episodes of opiate users, mostly injectors, are also routinely monitored, and all drug users in treatment are kept on a register. In the Russian Federation, for example, the number of illicit drug users treated, mostly opiate-dependent injectors, increased from 45,000 in 1992 to 275,000 in 2000 (see figure I).

**Figure I.** Number of registered cases of "narcomania" in the Russian Federation per 100,000 population



Source: Russian Federation, Ministry of Health.

Note: The term "narcomania" is a Russian word meaning addiction. Those affected by narcomania are considered to comprise various types of drug abuser or illicit drug user, or both, including injectors, or all types of clients admitted for drug treatment. The proportion of injectors among those admitted is estimated at 60 to 70 per cent.

However, only a small fraction of all persons with a recent history of drug injecting are believed to be in treatment at any given time in Eastern European countries, implying an urgent need to arrive at more reliable estimates of the real number of IDUs.

The lack of reliable IDU estimates is currently the main concern of programme developers in the region. In 1999, a review of all the available data and estimates suggested that with up to 600,000 IDUs in Ukraine and between 1.5 and 3 million IDUs in the Russian Federation, amounting to more than 1 per cent of the population in each country, that region might be experiencing the highest rate of drug injecting among all world regions [14]. The very large number of registered HIV infections among IDUs, with more than 100,000 new cases in the Russian Federation alone in 2001, also suggests a major drug-injecting problem (V. Prokrovskyi, Russian Federal AIDS Centre, personal communication).

However, many individual cities and administrative regions rely only on very rough estimates of the real number of IDUs derived from key informants' interviews and the rather erratic use of treatment demand multipliers. Most projects therefore have no clear idea of the number of IDUs in their catchment area, or the proportion of them reached by prevention services. The Ministry of Health of Ukraine, for instance, has estimated that between 5 and 15 per cent of all IDUs countrywide are reached by prevention services [15], but in reality estimates may vary even more widely, depending on which sites are used for extrapolation.

Several community-based studies are now under way, and the United Nations International Drug Control Programme is currently auditing all the available data and assessing data quality in the region.

## **Situation assessments in Africa**

In Africa, where there are serious constraints on the collection of data specifically on drug use, owing in part to the shortage of qualified research personnel, basic equipment and funding. The emphasis has been on the local IDU situation and baseline assessments, rather than on the collection of countrywide or region-wide data on IDUs, HIV or prevention programmes. The priority has been to establish the existence of a significant drug-injecting problem in countries where there is already preliminary or anecdotal evidence of it.

Several studies have now confirmed the existence of illicit drug injecting in countries such as Kenya [16], Nigeria [17] and South Africa [18, 19] and significant rates of HIV risk behaviours among IDUs. Furthermore, questionnaires returned by Member States to the United Nations International Drug Control Programme indicate that drug abusers in several other countries in Africa do inject illicit drugs. Such data lack essential details, however, as most are not derived from systematic studies.

A study of 86 current injectors in hospitals in Johannesburg, South Africa, showed significant rates of medical sequelae of non-sterile injecting of synthetic opiates, including thrombo-phlebitis, right-side endocarditis and HIV [18]. Another report, from Gauteng and Cape Town, also in South Africa, showed an increasing proportion of heroin users among hospital patients, with 36 and 51 per cent respectively of them admitting at least incidental injecting modes of consumption. Unfortunately, the report did not provide the absolute numbers of patients involved, nor information on their HIV status [19].

The Kenya (Nairobi and Mombasa) and Nigeria (Lagos) studies not only confirm the existence of significant drug injecting outside hospital patient populations, but also the difficulties in directly attributing HIV transmission to drug use in settings where HIV infections are frequent due to sexual transmission [16, 17]. In both studies, the researchers experienced no difficulties in recruiting a significant number of drug users from the streets and interviewing them about the extent of their injecting, the associated risk factors and the services available to them. In Lagos, 398 street users of heroin and cocaine were recruited through snowball sampling techniques from four local government areas, of whom 82 reported having ever injected and 54 currently injecting. The injecting risk factors identified included sharing and reusing injecting equipment and injecting in a dirty environment. The preliminary results of the Nairobi and Mombasa study seem to be similar to those of the Lagos study.

The HIV risk attributable to drug injecting was not clear in the Lagos study, and detailed results for the Kenya study are not yet available. Although the 10 per cent HIV prevalence rate of the sample of drug users in Lagos was higher than the

5 per cent prevalence rate of the general population, there was no significant difference between the HIV rates obtained for non-injectors (10 per cent) and ever-injectors (8.9 per cent). Furthermore, female drug abusers, irrespective of their injecting status, were significantly more likely to be HIV positive than their male counterparts, a factor possibly attributable to the fact that most of the females also engaged in commercial sex work.

Thus the few available studies all suggest that, although not as rare as hitherto perceived, drug injecting is probably much less frequent in sub-Saharan Africa than in other regions and that the drug-injecting epidemics are at an early stage. However, there is a risk that the extent of the problem may continue to be underestimated, even if in reality drug injecting and associated HIV risks increase. The reasons for this are the low level of awareness among drug policy makers, law enforcement agencies and the general public of the possible link between IDU and HIV/AIDS and the associated consequences in this region [16], the tendency among AIDS programme managers not specifically to consider drug users when determining HIV surveillance sites and protocols and the logistical constraints related to research and programme development mentioned above.

In North Africa and the Middle East, IDU/HIV data collection efforts have also mostly concentrated on situation assessments and individual studies. However, the results differ in that drug injecting may well be more frequent there than in sub-Saharan Africa, while sexual HIV transmission is much less widespread, leading to injecting drug use representing a major or even the most significant mode of HIV transmission in some of the countries. For example, recent reports indicate that IDUs constituted 91.7 per cent of the 4,439 HIV/AIDS cases registered among Libyan nationals up to the end of 2001 [20]. The percentages of IDUs among reported AIDS cases in Algeria, Bahrain and Tunisia were 18.4, 73 and 34 respectively [21].

In a recent report commissioned by the World Bank, all the available data reported on drug injecting and HIV in the North Africa and Middle East region were compiled [22].

## **Summary and conclusions**

In the three regions of Asia, Eastern Europe and Africa, the collection of data on HIV/AIDS and drug use concentrated initially almost exclusively on the description of samples of IDUs and the prevalence and incidence rates of HIV/AIDS among them. Indeed, to date, reliable information on the real size of the IDU population is still frequently lacking, despite efforts by the United Nations International Drug Control Programme and others to collect such data. That finding is not particularly surprising, given that IDUs usually constitute a semi-hidden population that tends to avoid contact with law enforcement authorities and often with health authorities as well and thereby escapes direct estimation [23]. Very few good national-level estimates of the true numbers of IDUs in specific sites exist, although sometimes seemingly exaggerated figures provided by

Governments gain in plausibility when additional data sources become available, such as the large number of HIV infections reportedly due to IDU in the Russian Federation. Efforts to establish the level of HIV infection in the IDU population usually rely on ad hoc testing among IDU populations such as those attending services, receiving treatment in hospital, sampled through outreach, arrested for illicit use or living in the street, while systematic sentinel surveillance approaches still represent the exception rather than the rule [24].

The situation with regard to data collection for HIV prevention among IDUs in Latin America has not been described in the present article but is unlikely to differ significantly from that in other developing regions. Nor are the situations in Australia, North America and Western European countries described here, although surveillance activities in those regions are more systematic [25]. By contrast, most African countries appear to lack even the basic data needed to monitor HIV infection related to injecting drug use. Although HIV infection on the African continent remains largely of heterosexual origin, the role of injecting drug use may not have been sufficiently researched and has perhaps been underestimated.

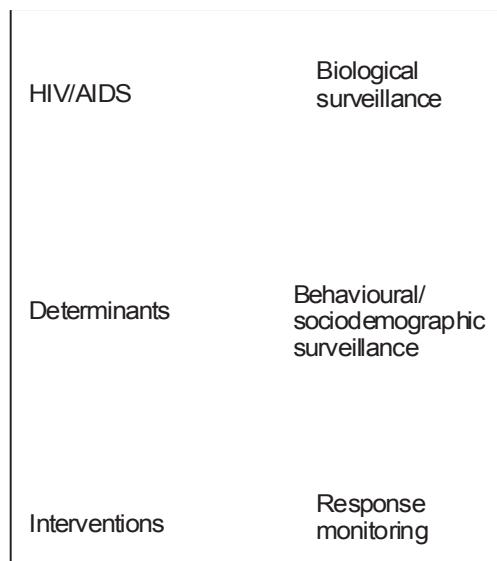
It is only recently that efforts have been intensified to supplement biological surveillance with behavioural surveillance. The Asian experience, in particular, shows that the concept of "second generation surveillance" [26] adds significantly to the understanding of the twin epidemics of drug use and HIV. As the example from Bangladesh illustrates, behavioural data can point to the presence of factors explaining changes in the epidemic or warn of the epidemic's future potential (table 2). Unfortunately, in most countries those efforts have been limited to a few sites.

While the interplay between biological and behavioural surveillance may generate useful insights into the course and determinants of the HIV epidemic, its suggestive power with regard to the nature of appropriate public health responses is, however, limited. The important question of how the response to drug use and HIV should be modified is unlikely to be answered in the absence of a description of the activities that are in place. Similarly, learning from success by examining how change has been achieved depends on an understanding of the responses employed. Therefore, monitoring the public health response to HIV/AIDS, in particular service delivery, represents a critical third component of drug monitoring and biological and behavioural surveillance systems, and it is the integration of all three components that can turn such systems into more powerful and relevant public health planning tools (see figure II).

To date, in all the regions reviewed, the collection of data on the availability of treatment and prevention services for IDUs has been, in the context of limited reach, low on the priority list. However, as the number of IDUs enrolled in needle-syringe exchange programmes in Eastern Europe and Asia increases, so does the demand for more precise information on the actual and desirable reach of existing programmes.

Ultimately, working towards a public health response to HIV among IDUs that integrates existing scattered projects into cohesive programmes on an appropriate scale is the objective of establishing comprehensive surveillance and monitoring

Figure II. Monitoring HIV prevention among injecting drug users



systems. Although the effectiveness of certain HIV prevention interventions is well established, such systems need to take a perspective that extends beyond a single intervention and is based on a full understanding of the appropriate mix and coverage of services at the city, province and country levels.

It is recognized that no single intervention can halt HIV transmission among IDUs and their non-injecting partners; the prevention of IDU-related HIV epidemics requires the provision of a range of services, including community-based information, education and communication; voluntary counselling and testing; the provision of sterile injecting equipment and condoms; and treatment and care for IDUs [27].

Each of those service areas can be described in a number of dimensions [28]: “provision of services” aims to capture the nature of services delivered and includes features such as the affiliation of services and the cost of services at the point of delivery; “service utilization” aims to quantify to what extent the services offered are being used by IDUs and highlight their accessibility and acceptability; and “service coverage” relates the observed utilization to the potential demand, in terms of the entire IDU population, specific geographical areas (such as rural versus urban areas) or IDUs living in specific settings (such as incarcerated IDUs).

The barriers that tend to prevent an effective response are poorly understood and may include outdated health care and HIV prevention concepts and structures, as well as a lack of understanding of the contextual and political environments in which policies and programmes are being developed [29].

In particular, many decision makers appear to fail to take into account the crucial concept of "service coverage". For example, Burrows reported that ministry of health officials in one Eastern European country had failed to take into account the fact that the coverage of types of programme that had proved effective elsewhere had been minimal and had repeatedly described them as "ineffective" or "of doubtful effectiveness" because the number of HIV infections had continued to rise in the cities employing those approaches [30]. Conveying the message to public health planners and decision makers that even the most effective intervention can only prevent infections among those reached is therefore one critical objective of integrated monitoring and surveillance systems.

The above example illustrates that the objective is not only to fill in the gaps in drug epidemiology and biological, behavioural and response data, but also to make strategic use of such data for HIV programming. To achieve that objective, a broad understanding of epidemiological data beyond individual geographical locations and across various public health disciplines will be required. Such a global understanding of epidemiological data could, and should, play a key role in driving and shaping the political agenda of all stakeholders, such that their goals are appropriate and realistic and their pledges for funding meet the identified needs.

## **References**

1. Joint United Nations Programme on HIV/AIDS (UNAIDS), *Report on the Global HIV/AIDS Epidemic, June 2000* (Geneva).
2. A. Ball, "HIV prevention among injection drug users", *Global Research Network Meeting on HIV Prevention in Drug-Using Populations, Inaugural Meeting*, Geneva, 25-26 June 1998 (Baltimore, Maryland, United States of America, National Institute on Drug Abuse), pp. 13-18.
3. D. Des Jarlais and others, "The structure of stable sero-prevalence HIV-1 epidemics among injecting drug users", in *Drug Injecting and HIV*, G. Stimson, D. Des Jarlais and A. Ball, eds. (London, UCL Press, 1998), pp. 91-100.
4. M. Farrell and others, "Effectiveness of drug dependency treatment in prevention of HIV among IDUs", *Thirteenth International Conference on the Reduction of Drug-Related Harm*, Ljubljana, 3-7 March 2002.
5. S. F. Hurley, D. J. Jolley and J. M. Kaldor, "Effectiveness of needle-exchange programmes for prevention of HIV infection", *Lancet*, vol. 349, No. 9068 (1997), pp. 1797-1800.
6. A. Ball, "HIV prevention among drug users in Asia", *World Health Organization Western Pacific Regional Office HIV/AIDS/TB Programme Management Meeting*, Melbourne, Australia, 2-4 October 2001 (Manila, World Health Organization (WHO)).
7. People's Republic of Bangladesh, Ministry of Health and Family Welfare, Directorate General of Health Services, AIDS and STD Control Programme, "Report on the second national expanded HIV surveillance, 1999-2000" (September 2000).
8. National AIDS Control of India (NACO). Web site at [www.naco.nic.in/vsnaco/indianscene/executive.htm](http://www.naco.nic.in/vsnaco/indianscene/executive.htm) (accessed 19 September 2002).

9. G. Reid and G. Costigan, *Revisiting "The Hidden Epidemic": A Situation Assessment of Drug Use in Asia in the Context of HIV/AIDS* (Burnet Institute and the Centre for Harm Reduction, Australia, 2002).
10. UNAIDS South East Asia Intercountry Team, "Best practice case study of the Bangkok Metropolitan Authority Methadone Treatment Programme", forthcoming.
11. Hong Kong Special Administrative Region of China, Security Bureau, Narcotics Division, "Report on review of Methadone Treatment Programme" (Hong Kong Special Administrative Region of China, 2000).
12. UNAIDS Eastern Europe IDU Task Force secretariat, "Inventory of Needle Exchange/Outreach Projects" (Vienna, 2002).
13. K. L. Dehne, "HIV among IDUs and the extent of heterosexual spread in Eastern Europe", *Global Research Network Meeting on HIV Prevention in Drug-Using Populations, Fourth Annual General Meeting*, Melbourne, October 2001 (National Institute on Drug Abuse, Baltimore, Maryland, United States of America, 2001).
14. K. L. Dehne and Y. Kobayshcha, *The HIV Epidemic in Central and Eastern Europe: Update 2000* (UNAIDS, Geneva, 2000).
15. Ukraine, Ministry of Health, *HIV/AIDS Surveillance in Ukraine, 1987-2000* (Kiev, Ukrainian AIDS Centre and UNAIDS, 2000).
16. M. Odek-Ogunde, "Preliminary report on the World Health Organization Drug Injecting Study Phase II in Nairobi, Kenya", paper presented at the *United Nations International Drug Control Programme and Joint United Nations Programme on HIV/AIDS Workshop on Drug Abuse and HIV/AIDS in Africa*, Sharm El Sheikh, Egypt, 5-9 November 2001.
17. M. L. Adelekan and others, "Injection drug use and associated health consequences in Lagos, Nigeria: findings from the World Health Organization Drug Injecting Study Phase II", *Third Annual Meeting Report, Global Research Network Meeting on HIV Prevention in Drug-Using Populations*, July 2000, Durban, South Africa (Department of Health and Human Services, United States of America, 2001), pp. 27-41.
18. P. G. Williams, S. M. Ansell and F. J. Milne, "Illicit intravenous drug use in Johannesburg: medical complications and prevalence of HIV infection", *South African Medical Journal*, vol. 87, No. 7 (1997), pp. 889-891.
19. South African Community Epidemiology Network on Drug Use, "Alcohol and drug abuse trends: July-December 2001", in *SACENDU Update*, C. Parry and others, eds. (Medical Research Council, South Africa, April 2002).
20. M. A. Sammud, "Libyan Arab Jamahiriya report", presented at the *Twelfth Inter-Country Meeting of National AIDS Programme Managers*, 23-26 April 2002, Beirut.
21. World Health Organization, "Progress report on acquired immunodeficiency syndrome (AIDS) in the Eastern Mediterranean region", *Forty-eighth Session of the Regional Committee for the Eastern Mediterranean*, 30 September-4 October 2001 (Alexandria, Egypt, WHO Regional Office).
22. C. Jenkins, and D. Robalino, "Overview of the HIV/AIDS situation in the Middle East and North Africa and Eastern Mediterranean region", paper presented at the *Conference on Meeting the Public Health Challenges in the 21st Century in the Middle East, North Africa and Eastern Mediterranean Region*, 17 June 2002 (World Bank, forthcoming).

23. D. Des Jarlais, K. L. Dehne and J. Casabona, "HIV surveillance among injecting drug users", *AIDS*, vol. 15, Suppl. 3, pp. S13-S22.
24. UNAIDS and WHO, Epidemiological fact sheets on HIV/AIDS and sexually transmitted infections (Geneva, 2000).
25. European Monitoring Centre for Drugs and Drug Addiction, *Annual Report on the State of the Drugs Problem in the European Union* (Lisbon, 2001). Available online at <http://annualreport.emcdda.org/> (accessed 20 September 2002).
26. UNAIDS and WHO Working Group on Global HIV/AIDS and STI Surveillance, *Guidelines for Second Generation Surveillance for HIV: The Next Decade*. Available online at [www.who.int/emc/documents/aids\\_hiv/whocdscsredc20005c.html](http://www.who.int/emc/documents/aids_hiv/whocdscsredc20005c.html) (accessed 20 September 2002).
27. United Nations, "Preventing the transmission of HIV among drug abusers: a position paper of the United Nations System", *Annex to the Report of the Eighth Session of the Administrative Committee on Coordination Subcommittee on Drug Control*, 28-29 September 2000. Available online at [www.unaids.org/publications/documents/specific/injecting/Hraids.doc](http://www.unaids.org/publications/documents/specific/injecting/Hraids.doc) (accessed 20 September 2002).
28. G. Weiler, C. Archibald and J. Siushansian, "Global indicator database on HIV prevention in injecting drug users: a discussion paper", *Global Research Network Meeting on HIV Prevention in Drug-Using Populations, Fourth Annual General Meeting*, 11-12 October 2001, Melbourne.
29. T. Rhodes and others, "Drug injecting, rapid HIV spread and the 'risk environment': implications for assessments and response", *AIDS*, vol. 13, Suppl. A, pp. 259-269.
30. D. Burrows, personal communication (2002).