

A situation update on HIV epidemics among people who inject drugs and national responses in South-East Asia Region

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We explore the magnitude of and current trends in HIV infection among people who inject drugs and estimate the reach of harm reduction interventions among them in seven high-burden countries of the South-East Asia Region. Our data are drawn from the published and unpublished literature, routine national HIV serological and behavioural surveillance surveys and information from key informants. Six countries (Thailand, Myanmar, Nepal, Indonesia, India, and Bangladesh) had significant epidemics of HIV among people who inject drugs. In Thailand, Indonesia, Bangladesh, Myanmar and India, there is no significant decline in the prevalence of HIV epidemics in this population. In Nepal, north-east India, and some cities in Myanmar, there is some evidence of decline in risk behaviours and a concomitant decline in HIV prevalence. This is countered by the rapid emergence of epidemics in new geographical pockets. Available programme data suggest that less than 12 000 of the estimated 800 000 (1.5%) people who inject drugs have access to opioid substitution therapy, and 20–25% were reached by needle–syringe programmes at least once during the past 12 months. A mapping of harm reduction interventions suggests a lack of congruence between the location of established and emerging epidemics and the availability of scaled-up prevention services. Harm reduction interventions in closed settings are almost non-existent. To achieve significant impact on the HIV epidemics among this population, governments, specifically national AIDS programmes, urgently need to scale up needle–syringe programmes and opioid substitution therapy and make these widely available both in community and closed settings.

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Background

Globally, about 15.9 million (range 11.0–21.2 million) people inject drugs [1]. Injecting drug use contributes substantially to the transmission of bloodborne viruses, including HIV, and is responsible for an increasing proportion of new HIV infections [2]. Approximately 3 million people who inject drugs (PWID) are currently living with HIV [1].

Historically, HIV prevalence among PWID in Asia has been among the highest in the world [3–7]. In several Asian countries, HIV infection among PWID accounts for a significant proportion of overall HIV infections. Approximately half of the cumulative HIV cases reported in Indonesia are associated with injecting of drugs [8]. Moreover, HIV outbreaks among PWID have seeded wider sexual epidemics [7]. Even in countries where overall HIV prevalence has remained relatively low

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(e.g. Bangladesh), modelling has shown that a sharp rise in HIV infection among PWID could set in motion an epidemic that may otherwise have taken many decades to develop [9]. As drug use is illegal in most countries, this region has a sizeable population of incarcerated PWID [10–13]. HIV prevalence in prisons is often significantly higher than in the general population. The risk of being infected in prison through sharing of contaminated injecting equipment and unprotected sex is high [14,15]. A Thai study of 689 prisoners found that half were PWID and that 49% had injected while in prison [16].

Harm reduction is an important public health measure in preventing or reducing HIV transmission among PWID [17]. Without harm reduction activities, HIV prevalence among PWID can rise to 40% or more within 1 or 2 years after the virus is introduced in their communities [18]. In response to the serious epidemics of HIV among PWID, most national AIDS programmes in the South-East Asia Region have initiated evidence-based harm reduction interventions, including needle–syringe programmes (NSPs) and opioid substitution therapy (OST) [19,20]. However, information on the scale and quality of these interventions is limited, and data on the impact of such programmes on reducing risk behaviours and HIV prevalence have not been synthesized or documented recently. In this article, we review the current data on the magnitude of and trends in HIV infection among PWID and examine the scale and coverage of NSPs and OST in selected countries of south-east Asia. This review did not focus on other harm reduction interventions, such as the provision of condoms and antiretroviral therapy (ART) to HIV-positive PWID. Other countries in Asia with a high HIV burden such as Viet Nam, Malaysia and China have not been considered as they do not fall under the administrative purview of the World Health Organization's (WHO) South-East Asia Region.

Methods

This review drew on the published and unpublished literature, routine serological and behavioural surveillance data, and verbal and written communication with key informants. The literature was gathered manually and via electronic sources for seven high-burden countries of the WHO South-East Asia Region (Bangladesh, Indonesia, India, the Maldives, Thailand, Myanmar and Nepal are reported to have high burdens of substance use, whereas Sri Lanka, Bhutan, Timor-Leste and DPR Korea currently report low or no prevalence.) Electronic data sources included Medline, PubMed, the Social Sciences Citation Index, Social Sciences Index and Abstracts, and the International Bibliography of the Social Sciences. Key peer-reviewed journals published in the past 5 years (2003–2008) were searched. Literature was also collected from the websites of WHO, Joint United Nations

Programme on HIV/AIDS (UNAIDS), United Nations Office on Drugs and Crime (UNODC), Family Health International (FHI), International Harm Reduction Association (IHRA), McFarlane Burnet Institute, Asian Harm Reduction Network (AHRN) and Three Diseases Fund. Unpublished and published reports were collected from service providers, nongovernmental agencies and individual experts. Direct e-mail requests to national AIDS programmes and large nongovernmental service providers (such as the Bill and Melinda Gates Foundation) were also made to understand the current coverage of harm reduction services.

In this article, we draw a distinction between the terms 'coverage' and 'reach'. 'Reach' is defined as the proportion of PWID in a geographical area provided with an intervention [21]. We use a 12-month time period as it matches with the time frame used by national and global monitoring indicators. WHO defines coverage as 'the proportion of the population in need of an intervention which has received an effective intervention' [22,23]. This implies that services have to be provided in a manner that has an impact and results in a decline in risk behaviours, that is, an individual provided with sterile equipment once a month may be considered 'reached' but not 'covered'. In order to be covered, a significant proportion of injections must occur with a new needle and syringe. Although there is ongoing debate about what constitutes 'effective' levels of coverage and how they may vary with intervention type, retrospective studies indicate that coverage levels of even 20–30% can have an impact on reducing HIV incidence among PWID [24–27].

Findings

Magnitude of and trends in HIV infection among people who inject drugs

An estimated 800 000 PWID live in the WHO South-East Asia Region. HIV prevalence among PWID in countries of the South-East Asia Region varied widely (0% in the Maldives to 52% in Indonesia) [28,29]. Bangladesh, currently, has a relatively low HIV prevalence of 7.1% but is showing a rising trend [30]. In many cities, HIV prevalence among PWID has remained above 25% over the past 5 years (Fig. 1) [30–35].

Analyses of country-wise trends show that HIV prevalence has been high and stagnant in Thailand, Myanmar and most states of India and is rising in Indonesia and Bangladesh. Exceptionally, in Nepal, HIV prevalence has decreased in all the regions (Fig. 2) [35].

Little information is available on HIV incidence in populations of PWID. Recent modelling data from Thailand suggest that HIV incidence is the highest among

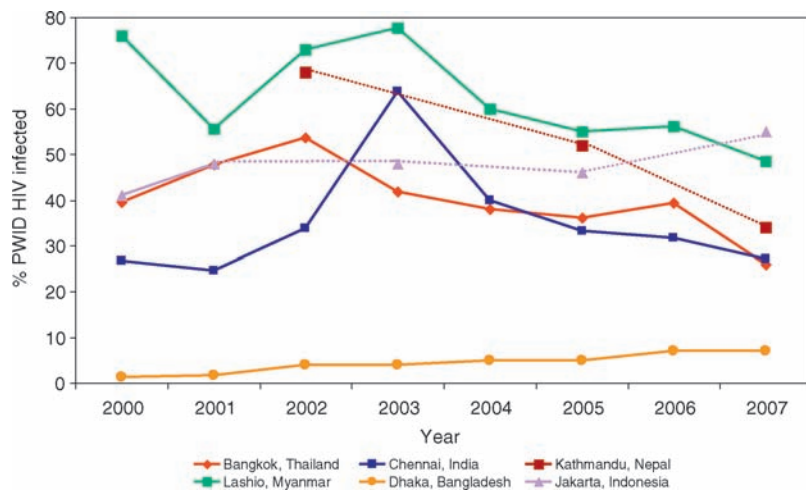


Fig. 1. HIV prevalence among people who inject drugs in selected cities in south-east Asia, 2000–2007. PWID, people who inject drugs. Data from sentinel surveillance data, Ministries of Health (Thailand [31], India [32], Indonesia [33], Myanmar [34]), 2007; Integrated Biological and Behavioural Survey (IBBS), FHI/Ministry of Health, Nepal, 2007 [35]; HIV serological survey, MoH Bangladesh, 2007 [30]; NACO, sentinel surveillance data, India, 2007 [32].

PWID (2.6 per 100 per year) [36]. In parts of the north-eastern states of India (Manipur and Nagaland), HIV incidence as measured by prevalence among young PWID (aged 15–24 years) has decreased from 11% in 2003 to 3.2% in 2007 [32].

National sentinel surveillance data indicated a wide variation in the reported HIV prevalence within countries. In India, HIV prevalence was highest (typically over 15%) in the metropolitan cities, Punjab, and the North-East but below 5% in states such as Karnataka, Andhra Pradesh, Uttar Pradesh and Bihar (Fig. 3) [28,37–41]. In Myanmar, HIV prevalence among PWID ranged from 19% in Yangon to 54.5% in Myitkyina [38].

Injecting drug use and sexual risk behaviours

Bangladesh and India reported the highest rates of needle–syringe sharing [data from behavioural sentinel

surveys (BSS)] (Fig. 4) [28,38–41]. Routine BSS data were not available for Thailand; however, one study reported that 80% of its participants had occasionally shared injecting equipment in the past 12 months [42].

Rates of unsafe injecting and sexual risk behaviours were also high. Exceptionally, despite high levels of syringe sharing in Bangladesh, HIV prevalence among PWID is comparatively low, though it has grown five-fold from 1.7 to 7.1% in the capital Dhaka [30]. Postulated reasons include limited sexual transmission among PWID (and to their sexual partners) due to the high prevalence of male circumcision and declining syphilis rates, small size of sharing networks and patterns of drug use that limit HIV transmission. Notably, harm reduction interventions including large-scale NSPs began in 1998 when HIV prevalence among PWID was still below 1%, and

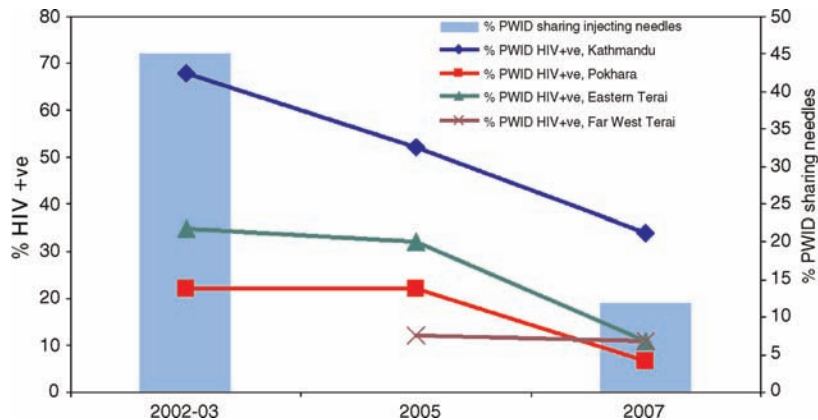


Fig. 2. HIV prevalence and needle sharing among people who inject drugs by region, Nepal, 2002–2007. PWID, people who inject drugs. Data from Integrated Biological and Behavioural Survey (IBBS), FHI/Ministry of Health, Nepal, 2002–2007 [35].

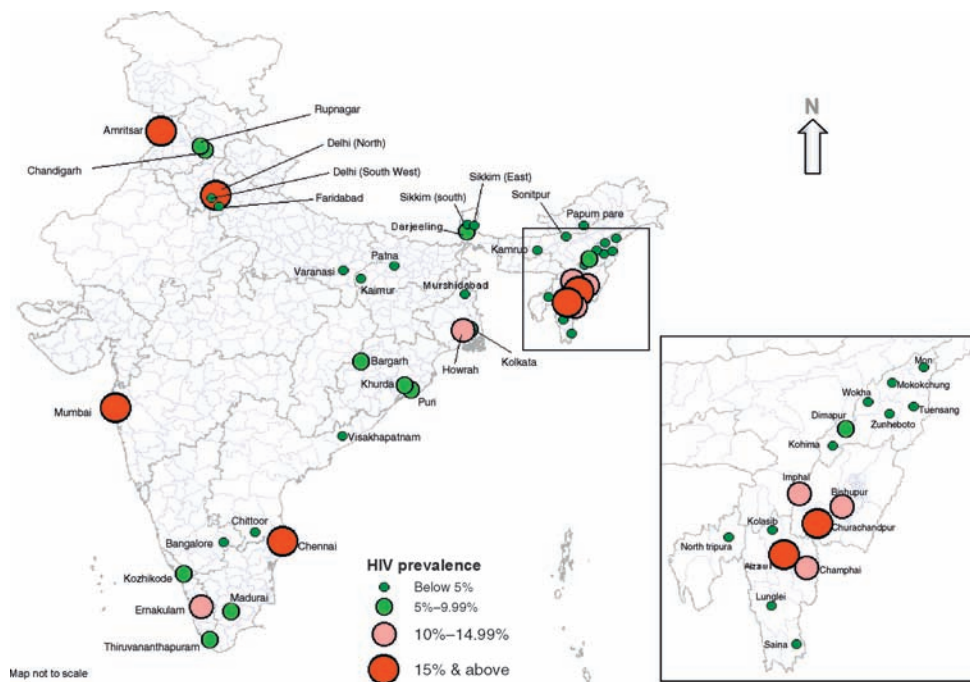


Fig. 3. HIV prevalence among people who inject drugs, by site, India, 2007. Data source: Sentinel surveillance data, NACO, 2008 [37].

modelling data suggest that this may have reduced HIV incidence in Dhaka by over 90% [43].

A reduction in needle–syringe–sharing behaviour was evident in Nepal. In Kathmandu, rates of needle–syringe sharing had declined from 45% in 2002 to 12% in 2007 (Fig. 2) [35]. Concomitant declines were noted in HIV prevalence among PWID, from nearly 70% in 2002 to 34% in 2007 [35]. Rates of sharing equipment at last injection declined from 55% in 2001 to 26% in 2006 in north-east India (Manipur) [39], and HIV prevalence declined from nearly 52% in 2002 to just over 13% in 2007 [32].

Other risk behaviours

In Bangladesh, the proportion of PWID who bought sex in the last year from a female sex worker varied from 46 to 66%, whereas consistent condom use in the past year ranged from 14 to 43% [40]. During the last sexual encounter with a sex worker, less than 35% of male PWID reported condom use in Indonesia [41] and just over 37% in Nepal [44].

Vulnerability to HIV among PWID is enhanced by high rates of sexually transmitted infections (STIs). Integrated behavioural and biological assessments (IBBAs) conducted in Nagaland (India) showed active syphilis rates of

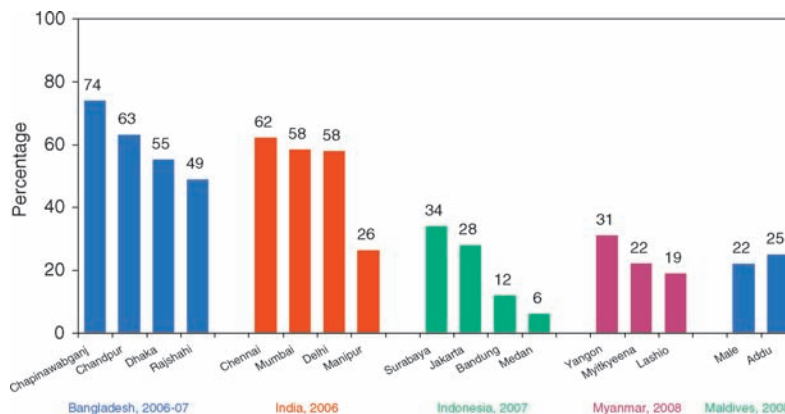


Fig. 4. Percentage of people who inject drugs sharing injecting equipment at last injection, south-east Asia, 2006–2008. Data from MoH BSS data (Bangladesh [42], India [41], Indonesia [43], Myanmar [38], Maldives [28]).

7–20% in 2008 [45]. Syphilis rates among female injectors are also high; in one site in Bangladesh, 10% were infected in 2006–2007 [40].

Magnitude of and trends in HIV infection among incarcerated people who inject drugs

Data in this area are scarce. HIV prevalence among prisoners in India, Indonesia and Thailand is generally above 10% [12]. HIV transmission in prisons may be fuelled by risk behaviours such as sharing of injecting equipment. A study among 95 inmates in five prisons in eastern Nepal found that 28% used drugs and, of these, 75% 'always' shared needles [46]. In a prospective cohort of 705 PWID in Klong Prem Prison in Thailand, 38% had injected while in prison, and 97% of these had shared injecting equipment [10]. Behavioural surveys in the Maldives also indicated that 32% of PWID had injected while in prison [28]. In Jakarta, Indonesia, routine sentinel surveillance data show HIV prevalence in prisoners of more than 10% in four sites [33]. A sampling of all prisoners in 2003 showed that only 5–10% were HIV-positive on entry to prisons, but approximately 20% of the total population was infected, suggesting that HIV is transmitted in prisons through risk behaviours [12]. In Timur Cipinang Prison in Jakarta, HIV prevalence increased from 17.8% in 2005 to 30.4% in 2006 [33]. Similar data among incarcerated PWID are not available from other countries of the region.

Availability and reach of harm reduction interventions in countries

Needle–syringe programmes

The number of NSP sites ranged from 159 in Indonesia to none in the Maldives (personal communication, National AIDS Programme Managers). Bangladesh reported the highest ratio of NSP-to-PWID populations (based on midpoint of population estimate) – one NSP for every 333 PWID (90 divided by 30 000). Myanmar has only one NSP per 3900 PWID (19 divided by 75 000). In Nepal, India and Indonesia, one NSP was available for 869, 1239 and 1378 PWID, respectively. NSPs are not officially available in Thailand or the Maldives, though there are anecdotal reports of small-scale informal syringe distribution.

The reach of NSPs is the highest in Bangladesh – between 31 and 61% of the lower and upper national size estimates of PWID in 2006 [47]. In 2008, it was between 44 and 88%, with 17 582 PWID accessing NSPs in the past 12 months (NAP, Bangladesh, personal communication). The National AIDS Commission in Indonesia reported 22% coverage with NSPs in 2007, with over 49 000 of the estimated 219 000 PWID accessing services during the year [48]. In Myanmar, 29 411 of the estimated 75 000 PWID (28%) were reached with HIV prevention services in 2007 [38]. The NAP in Nepal indicated that, in 2007, 31% of PWID were reached with NSPs [44].

Data on the frequency/regularity of contact with services were not available. The actual numbers of needles and syringes distributed from NSPs in comparison with the estimated need were low – in Nepal, 988 000 needles and syringes were distributed in 2006 – as opposed to an estimated need of 21 000 000 [44]. This indicates that the national AIDS programme provides less than 5% of the required needles and syringes in Nepal. In Myanmar, 2 091 166 needles and syringes were distributed in 2007 as opposed to an annual requirement of at least 27 million [38]. No data are available on the number of needles and syringes bought by individuals through pharmacy outlets.

Opioid substitution therapy

OST is available in a significant number of sites only in India (45 sites), Thailand (134 sites), Indonesia (29 sites) and Myanmar (seven sites) (personal communication, National AIDS Programme Managers). Site visits by one of the authors (M.S.) to Nepal and the Maldives in 2008 found that OST is available in only one site each; the number of patients accessing OST is small in both countries (<150 PWID). In Bangladesh, OST services are yet to commence, though government approval for a methadone-based pilot programme now exists. The total number of PWID reported to be accessing OST in the South-East Asia Region is approximately 12 000 (Table 1).

The proportion of PWID (based on national midpoint estimates) accessing OST in each of these countries in 2008 was less than 5% – 3.5% (India), 1.5% (Indonesia), 0.6% (Myanmar) and 0.7% (Nepal); see Table 1. In the Maldives, the programme commenced in October 2008, and approximately 30 PWID were enrolled at the time of writing.

OST is delivered as community-based service in India and the Maldives but is typically based in psychiatric or 'drug deaddiction' units in the other countries. In Myanmar, OST is offered on an inpatient basis during the stabilization period. The reported dosage of methadone varies from a high 82.7 mg in Indonesia (personal communication, National AIDS Commission) to a low 45 mg in Nepal [49]. Intracountry doses may also vary – in Myanmar, median doses across seven sites vary between 45 and 70 mg [50].

Location of services

Harm reduction interventions are clustered in certain geographical areas. In India in 2008, 96 of the 133 targeted interventions and 23 of the 45 OST sites are located in the north-east (personal communication, NACO, 2008). Several other sites with an HIV prevalence of 10–15% have very few interventions.

Programme reach

Improvements in programme reach have been noted in some countries. In Nepal, the percentage of PWID reached by prevention programmes doubled (from 12% in

Table 1. Status of opioid substitution therapy and needle-syringe programme implementation in selected countries of south-east Asia, 2008.

Country	Estimated population of PWID (range)	Estimated current enrolment (methadone substitution)	Estimated current enrolment (buprenorphine substitution)	Estimated number of sites offering NSP routinely
Bangladesh	20 000–40 000	0 ^a	0	90
India	106 518–223 121	0	6500	133
Indonesia	190 460–247 800	2711	500	159
Myanmar	60 000–90 000	500	0	19
Maldives	400	30	0	0
Nepal	16 100–28 000	104	30 ^b	23
Thailand	160 528	4000–5000	150	4

NSP, needle-syringe programme; PWID, people who inject drugs.

^aApproval for methadone given; service delivery yet to commence.

^bCurrently, a 3-month tapering dose rather than long-term therapy is being practised.

Data from personal communication with WHO Country Office and National AIDS Programme Staff.

2005 to 31% in 2007) [44]; in Indonesia, it increased from 7% in 2006 to 22% in 2007 [8].

Availability and reach of harm reduction interventions in prisons

Indonesia is the only country in the region to have produced a national strategy (2005–2009) to guide HIV prevention, care and treatment efforts in prisons [51]. The strategy focuses particularly on reducing injecting drug use-related HIV transmission.

No country in the region currently offers NSPs in closed settings. Bleach is available for the cleaning of injecting equipment in Kerobokan prison in Indonesia, and pilot condom distribution programmes have been started in a few prisons, though anecdotal reports suggest inconsistent availability of these [15]. There are plans to extend these to other prisons as well. In closed settings, OST is available only in four prisons in Indonesia, with plans to extend this service to other prisons [52]. OST has recently been started in Tihar jail in India by UNODC on a small scale, and the service will be extended to 60 prisoners [53].

Discussion

Current national data from seven countries in south-east Asia show that most countries have significant, long-standing epidemics of HIV among PWID, and new epidemics continue to emerge. The reach of harm reduction interventions to address these is inadequate. Merely 1.5% of the PWID are receiving OST, and 20–25% are reached by NSPs.

The geographical distribution of NSPs and OST programmes within countries is not always in tune with the magnitude and trends of the epidemic. In India, despite a markedly high HIV prevalence in many parts of the country (e.g. Punjab and Chennai), the availability of scaled-up NSPs and OST was limited largely to sites in the north-eastern states.

Gaps in the quality and ‘coverage’ of services prevent the attainment of behavioural and epidemiological goals [27]. To have an impact, PWID must receive a sufficient number of syringes to prevent reuse and be able to access sterile equipment as long as they continue to inject. OST must be administered at therapeutic doses for an adequate duration [27]. Unless these conditions are met, PWID cannot be considered ‘covered’.

Harm reduction interventions targeting prison populations in the region are almost nonexistent, despite evidence that the prevalence of HIV infection among incarcerated PWID is consistently higher than in the general population (above 10% in Indonesia, Thailand and India) [12,54].

The reasons for the poor uptake of and significant intercountry variations in harm reduction interventions remain intertwined and debatable. Many countries in the region face difficult public policy and legislative problems with regard to drug use. Tensions between traditional supply/demand reduction and harm reduction approaches are a major barrier to the roll-out of OST and NSP [55]. Methadone and buprenorphine remain unavailable and prohibitively expensive in many countries of the region. Countries such as Viet Nam and China, where a strong central body can take decisions and coordinate prevention efforts across various stakeholders, have been more successful in promulgating laws and legislation that facilitate HIV prevention activities [56–58].

Lack of country capacity to move beyond pilot programmes is another major constraint. OST was introduced in most countries of the region by 2004. Despite good outcomes, such programmes have not been scaled up to reach effective levels of coverage. Harm reduction services in south-east Asia are mostly implemented by nongovernmental organizations (NGOs) in community settings. While this helps in reducing stigma, improving access and generating community awareness, scaling up NGO-based services that operate outside the established public health system creates challenges, particularly in large countries such as India and Indonesia.

Lack of scaled-up programming is also frequently related to sustainable funding. An ongoing costing exercise by the United Nations Task Force on Injecting Drug Use in Asia indicates that the resource gap for harm reduction is significant, particularly when OST is included as part of the package [59]. Many countries of the region have donor-dependent harm reduction interventions that are not owned by national HIV programmes.

Limitations of the study

This study had several limitations. First, the estimates of national populations of PWID were frequently imprecise and complicated by widespread transitions from non-injecting to injecting drug use and vice versa. Without reliable denominators, measurements of the coverage of interventions become imprecise. Second, in the vast majority of sentinel surveillance sites, serological and behavioural surveillance data were collected from service delivery or intervention sites. This type of system, while helpful in tracking behaviours and providing information about the success of the response among the intervened populations, does not identify new HIV epidemics. Third, surveillance in prison sites was sparse, with only Indonesia routinely collecting serological data. Fourth, the definition of a 'person who injects drugs' was variable. This created challenges in comparing data across countries. Last, data on the access, reach and quality of harm reduction programmes were particularly poor. The lack of standardized definitions and indicators for coverage with specific reference to NSP and OST hampered the collation of data [27]. No indicators to measure quality or regularity/frequency of reach are used on a routine basis.

We were only able to report aggregate country-level data in this review, which masks massive variations in the scale and reach of interventions within countries. For example, nearly 45% of all sterile equipment distributed in Myanmar relates to one location in Kachin State (personal communication, UNAIDS, Myanmar). The actual reach or coverage of NSPs or both in this location could be much higher than the national average. We were also not able to gauge the extent of pharmacy sales to understand the true extent of access to sterile equipment for PWID.

Finally, this study did not review the legal/policy issues that constrain the full implementation of harm reduction interventions or attempt to differentiate between countries in the levels of 'enabling environment'.

Key messages

HIV epidemics among PWID remain uncontrolled in south-east Asia. Harm reduction interventions reach too few PWID. To make a dent in the HIV epidemics among PWID, national AIDS programmes should urgently scale up OST and NSP services to cover at least 50–60% of the population [27].

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There was no conflict of interest.

References

1. Mathers BM, Degenhardt L, Phillips B, Wiessing L, Hickman M, Strathdee SA, *et al.* **For the 2007 Reference Group to the UN on HIV and injecting drug use. Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review.** *Lancet* 2008; **372**:1733–1745. doi: 10.1016/S0140-6736(08)61311-2.
2. Hagan H, Des Jarlais DC. **HIV and HCV infection among injecting drug users.** *Mt Sinai J Med* 2000; **67**:423–428.
3. Reid G, Costigan G. *Revisiting the hidden epidemic: a situation assessment of drug use in Asia in the context of HIV/AIDS.* Melbourne: The Centre for Harm Reduction, Burnet Institute; 2002.
4. Perngmark P, Celentano DD, Kawichai S. **Needle sharing among southern Thai drug injectors.** *Addiction* 2003; **98**:1153–1161.
5. Pisani E, Dadun, Sucharya PK, Kamil O, Jazan S. **Sexual behaviour among injection drug users in 3 Indonesian cities carries a high potential for HIV spread to noninjectors.** *J Acquir Immune Defic Syndr* 2003; **34**:403–406.
6. Riono P, Jazant S. **The current situation of the HIV/AIDS epidemic in Indonesia.** *AIDS Educ Prev* 2004; **16 (Suppl A)**:78–90.
7. MAP. *AIDS in Asia: face the facts – a comprehensive analysis of the AIDS epidemics in Asia.* Bangkok, Thailand: Monitoring the AIDS Pandemic (MAP); 2004.
8. National AIDS Commission (NAC), Indonesia. *Country Report on the follow-up to the Declaration of Commitment on HIV/AIDS (UNGASS). Reporting period 2006–2007.* Jakarta: NAC, Ministry of Health; 2008. <http://www.aidsindonesia.or.id/documents/UNGASS%20Indonesia%20-%20small.pdf>. [accessed on 13 January 2008].
9. Saidel TJ, Des Jarlais D, Peerapatanapokin W, Dorabjee J, Singh S, Brown T. **Potential impact of HIV among IDUs on heterosexual transmission in Asian settings: scenarios from the Asian Epidemic Model.** *Int J Drug Policy* 2003; **14**:63–74.
10. Thaisri H, Lerwitworapong J, Vongsheree S, Sawanpanyalert P, Chadbanachai C, Rojanawiwat A, *et al.* **HIV infection and risk factors among Bangkok prisoners, Thailand: a prospective cohort study.** *BMC Infect Dis* 2003; **3**:25.

11. Department of Law and Human Rights. *Executive report. HIV prevention and care program in prison in Indonesia*. Jakarta: Directorate General of Correctional Institution; 2007.
12. World Health Organization (WHO). *HIV prevention, care and treatment in prisons in the South-East Asia Region*. New Delhi: WHO; 2007.
13. United Nations Office on Drugs and Crime (UNODC). *Module for prison intervention: South Asia*. New Delhi: UNODC Regional Office for South Asia; 2007.
14. Joint United Nations Programme on HIV/AIDS (UNAIDS). *Global AIDS epidemic report*. Geneva: UNAIDS; 2006.
15. United Nations Office on Drugs and Crime (UNODC). *HIV prevention, care, treatment and support in prison settings*. Vienna: UNODC; 2006.
16. Choopanya K, Des Jarlais DC, Vanichseni S, Kitayaporn D, Mock PA, Raktham S, et al. **Incarceration and risk for HIV infection among injecting drug users in Bangkok**. *J Acquir Immune Defic Syndr* 2002; **29**:86–94.
17. International Harm Reduction Association. What is harm reduction? <http://www.ihra.net/Whatisharmreduction> [accessed on 13 January 2009].
18. World Health Organization (WHO). *Status paper on prisons, drugs and harm reduction*. Copenhagen: WHO Regional Office for the European Region; 2005. <http://www.euro.who.int/document/e85877.pdf> [accessed on 13 January 2009].
19. World Health Organization (WHO), United Nations Office on Drugs and Crime (UNODC), Joint United Nations Programme on HIV/AIDS (UNAIDS). *Evidence for action on effectiveness of needle syringe programmes in HIV prevention*. Geneva: World Health Organization; 2004.
20. World Health Organization (WHO). *Evidence for action: effectiveness of drug dependence treatment*. Geneva: World Health Organization; 2004.
21. Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS Best Practice Collection. *High coverage sites: HIV prevention among injecting drug users in transitional and developing countries. Case studies*. Geneva: UNAIDS; 2006.
22. Hogarth J. *Glossary of healthcare terminology*. Copenhagen: WHO Regional Office for the European Region; 1975.
23. World Health Organization (WHO). *Background paper for the technical consultation on effective coverage of health systems, 27–29 August 2001, Rio de Janeiro, Brazil*. Geneva: WHO; 2001. http://www.who.int/health-systems-performance/technical_consultations/effcov_background.pdf [accessed on 14 January 2009].
24. Vickerman P, Hickman M, Rhodes T, Watts C. **Model projections on the required coverage of syringe distribution to prevent HIV epidemics among injecting drug users**. *J Acquir Immune Defic Syndr* 2006; **42**:355–361.
25. Heimer R. **Community coverage and HIV prevention: assessing metrics for estimating HIV incidence through syringe exchange**. *Int J Drug Policy* 2008; **19** (Suppl 1):65–73.
26. Hickman M, Higgins V, Hope V, Bellis M, Tilling K, Walker A, et al. **Injecting drug use in Brighton, Liverpool, and London: best 627 estimates of prevalence and coverage of public health indicators**. *J Epidemiol Community Health* 2004; **58**:766–771.
27. Sharma M, Burrows D, Bluthenthal D. **Coverage of HIV prevention programmes for injection drug users: confusions, aspirations, definitions and ways forward**. *Int J Drug Policy* 2006; **18**:92–98; doi:10.1016/j.drugpo.2006.11.012.
28. Department of Public Health, Ministry of Health, the Maldives. *2008 biological and behavioural survey findings*. Male, Maldives: Ministry of Health; 2008.
29. World Health Organization (WHO), Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF). *Epidemiological fact sheet on HIV/AIDS: Indonesia*. Geneva: UNAIDS; 2008.
30. Ministry of Health, Bangladesh. *HIV sentinel surveillance, Bangladesh*. Dhaka: National AIDS/STD Programme, Ministry of Health and Family Welfare; 2006.
31. Ministry of Health, Thailand. *HIV sentinel surveillance*. Bangkok: Ministry of Health; 2007.
32. National AIDS Control Organization (NACO). *HIV sentinel surveillance*. New Delhi: NACO, Ministry of Health and Family Welfare; 2007.
33. Ministry of Health, Indonesia. *HIV sentinel surveillance*. Jakarta: Ministry of Health; 2007.
34. Ministry of Health, Myanmar. *HIV sentinel surveillance*. Yangon: Ministry of Health; 2007.
35. Family Health International, Ministry of Health, New Era and SACTS. *Integrated biological and behavioural survey (IBBS) among injection drug users, 2002–2007*. Kathmandu: FHI; 2008.
36. Gouws E, White PJ, Stover J, Brown T. **Short term estimates of adult HIV incidence by mode of transmission: Kenya and Thailand as examples**. *Sex Transm Infect* 2006; **82** (Suppl III): iii51–iii55; doi: 10.1136/sti.2006.020164.
37. National AIDS Control Organization (NACO). *HIV sentinel surveillance report*. New Delhi: NACO, Ministry of Health and Family Welfare; 2008.
38. Ministry of Health and World Health Organization (WHO). *Report of the HIV Myanmar national behavioural surveillance survey, 2007–2008 report*. Yangon, Union of Myanmar: Ministry of Health; 2008 (draft).
39. National AIDS Control Organization (NACO). National behavioural surveillance survey. *Men who have sex with men (MSM) and injecting drug users (IDUs), 2006*. New Delhi: NACO, Ministry of Health and Family Welfare; 2007.
40. Ministry of Health, Bangladesh. *Behavioural surveillance survey, 2006–2007*. Dhaka: National AIDS/STD Programme, Ministry of Health and Family Welfare; 2007.
41. Ministry of Health, Indonesia. *HIV behavioural surveillance survey*. Jakarta: Ministry of Health; 2007.
42. Perngmark P, Vanchiseni S, Celentano DD. **The Thai HIV/AIDS epidemic at 15 years: Sustained needle sharing among southern Thai drug injectors**. *Drug Alcohol Depend* 2007; **92**:183–190; doi:10.1016/j.drugalcdep.2007.07.014.
43. Foss AM, Watts CH, Vickerman P, Azim T, Guinness L, Ahmed M, et al. **Could the CARE–SHAKTI intervention for injecting drug users be maintaining the low HIV prevalence in Dhaka, Bangladesh?** *Addiction* 2006; **102**:114–125.
44. Joint United Nations Programme on HIV/AIDS (UNAIDS). UNGASS Report, Nepal; 2008. http://cfs.unaids.org/country_factsheet.aspx?ISO=NEP [accessed on 14 January 2009].
45. Avahan. *Integrated biological and behavioural survey*. New Delhi: Avahan India; 2008.
46. Paul C, Gupta SD, Sharma S, Deb M. **Awareness, perception and risk behaviours of drug users in the prisons**. Paper presented at the XIV International AIDS Conference, Barcelona, 2002.
47. Reddy A, Hoque MM, Kelly R. **HIV transmission in Bangladesh: an analysis of IDU programme coverage**. *Int J Drug Policy* 2008; **19** (Suppl 1):S37–S46; doi:10.1016/j.drugpo.2007.11.015.
48. Indonesia CDC, Ministry of Health, National AIDS Commission. Monitoring IDUs' service coverage and quality monitoring. Presentation made at the WHO/UNAIDS Workshop on Monitoring and Evaluation of National HIV/AIDS interventions for Most-At-Risk Populations, Mysore, India, 15–18 July 2008.
49. National Centre for AIDS and STD Control. *External assessment of national response to HIV/AIDS in Nepal*. Kathmandu: Ministry of Health; April–June 2008 (draft).
50. Thaw A, Min Soe T, Htay H, Thida K, Win Myint T, Barrecheche O, et al. **Reduction in HIV risk behaviour among IDUs on methadone maintenance therapy (MMT) in Myanmar**. Poster presented at the International AIDS Conference, Mexico City, Mexico, 2008 [Exhibition TUPE 0557].
51. Directorate General of Corrections. National Strategy Prevention and Control HIV/AIDS and Drugs Abuse Indonesian Correction and Detention 2005–2009. Jakarta: Directorate General of Corrections; 2005.
52. Irawati I, Mesquita F, Winarso I, Hartawan, Asih P. **Indonesia sets up prison methadone maintenance treatment**. *Addiction* 2006; **101**:1525. doi: 10.1111/j.1360-0443.2006.01657.x.
53. United Nations Office on Drugs and Crime (UNODC) Project RAS/H71. <http://www.unodc.org/pdf/india/issues/issues01.pdf>.
54. Panda S, Kumar MS, Saravanamurthy PS, Mahalingam P, Vijaylakshmi A, Balakrishnan P, et al. **Risk factors for HIV infection in injection drug users and evidence for onward transmission of HIV to their sexual partners in Chennai, India**. *J Acquir Immune Defic Syndr* 2005; **39**:9–15.
55. UNAIDS, UNODCCP. *Drug use and HIV vulnerability: policy research study in Asia*. The report of the Task Force on Drug Use and HIV Vulnerability, October 2000, Bangkok, Thailand.

56. Law on HIV/AIDS Prevention and Control. No. 64/2006/QH11. Ha Noi: National Assembly of the Socialist Republic of Vietnam; 2006. http://www.unaids.org.vn/local/legaldocs/Lav%20on%20HIV.AIDS%20Prevention%20and%20Control%20_No%2064%20of%202006_.pdf.
57. National Assembly of the Socialist Republic of Viet Nam. Government Decree No. 108/2007/ND-CP of 26 June 2007. <http://www.unaids.org.vn/local/legaldocs/decreed%20no108%20e.pdf>.
58. Wu Z. **Summary of the HIV/AIDS prevention in 2007 and work plan for 2008.** Presented at the 2008 Annual Meeting of the Provincial AIDS Directors. 23 January 2008; Beijing.
59. Beever S, on behalf of the United Nations Task Force on Injecting Drug Use and HIV/AIDS for Asia and the Pacific. **Estimating resource needs and gaps for harm reduction in Asia.** Presentation at the Donor Conference on Harm Reduction, 28–30 January 2009; Amsterdam.