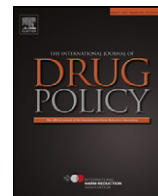




Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research paper

Performance and coverage of HIV interventions for injection drug users: Insights from triangulation of programme, field and surveillance data from Pakistan

Adnan A. Khan^{a,b,*}, Ayesha Khan^a^a Research and Development Solutions, Pakistan^b Ministry of Health, Pakistan

ARTICLE INFO

Article history:

Received 7 May 2010

Received in revised form 17 January 2011

Accepted 14 March 2011

Keywords:

IDU interventions

Programme performance

Cost-effectiveness

Coverage

Monitoring and evaluation

National response

ABSTRACT

Introduction: Nearly 20% of the estimated 84,000 injecting drug users in Pakistan are HIV infected. Non-governmental organisations have implemented HIV interventions for IDUs in 7 cities in Pakistan. Here we report on the performance, coverage and costs of these interventions.

Methods: National HIV bio-behavioural surveillance data were used to measure effectiveness of interventions by comparing HIV prevalence and behavioural trends in intervention and non-intervention cities. Coverage was measured by comparing the supply of syringes with the total syringe need and intervention cost per IDU served per year was calculated.

Results: The NGOs registered 20,640 IDUs (original targets: <10,000); provided 66% of new syringes for all registered IDUs and 75% for all estimated street-based IDUs. This compared to a national coverage of about 13%. Intervention cities had higher baseline HIV prevalence, reflecting their choice as intervention sites. More IDUs from intervention cities (59% vs. 27%) reported always using a clean syringe. Condom use with last sexual partner (24% vs. 11%) and HIV prevention knowledge were also higher amongst this group (all at $p < 0.001$). HIV prevalence in intervention cities remained unchanged in Faisalabad (13%) and Quetta (10%) but increased in Karachi (26–30%) and Lahore (4–7%). Coverage of sterile syringes for intervention cities was 30% compared to 13% nationwide. However within city, coverage varied from 30 to 99%. The costs of services varied widely by NGOs from USD 146 to 403.

Conclusions: IDUs interventions are performing well in some Pakistani cities. However, considerable expansion is needed to increase nationwide coverage.

© 2011 Elsevier B.V. All rights reserved.

Introduction

By 2008, HIV had become widespread amongst street-based injection drug users (IDUs) and some male sex workers in Pakistan. IDUs constitute about 0.25% of the adult population in large cities and 20% (intercity range: 0–51%) are infected with HIV (Khan and Khan, 2010a, 2010b; National AIDS Control Programme of Pakistan & HASP, 2005, 2006, 2007). To date, very few female IDUs or those who inject at home or in private spaces have been identified.

The national HIV Programme in Pakistan was established in 1987. Syringe-exchange services were implemented in Karachi and Lahore by 2000 and in 2004, with an annual budget of USD 10 million, a national “Enhanced AIDS Control Programme” commenced, focusing on sex workers and IDUs. Non-governmental organisations (NGOs) implemented HIV prevention interventions in 7 cities targeting 10,000 street-based IDUs. Surveillance had con-

firmed high HIV prevalence amongst IDUs in several cities and had estimated that there were nearly 84,000 street-based IDUs nationwide and approximately 36,000 in the larger cities (Khan and Khan, 2010a, 2010b). Initially little was known about HIV prevalence rates, IDU behaviours or the potential costs of prevention programmes, thus the Enhanced AIDS Control Programme was based on “guesstimates” of what services would cost and was driven in part by the donors who also funded national HIV surveillance amongst IDUs and sex workers. Interventions included syringe exchange, condoms, voluntary counselling and testing (VCT), detoxification, wound care, primary healthcare and social support. Non-pharmacologic rehabilitation of drug users is provided by all participating NGOs (Khan and Khan, 2010a, 2010b). However, opioid substitution therapy is not available, except in a few “for-profit” clinics.

Debates continue about how best to measure the effectiveness of HIV interventions. Cross-sectional surveys may detect changes in HIV prevalence and behaviours over time, but lag incidence by years. Incidence monitoring measures impact (i.e. new HIV infections), but is technically demanding and costly. Measures of intervention coverage assess behaviour change (outcomes) as IDUs seek out and use services, including syringes-exchange.

* Corresponding author at: Research and Development Solutions, Flat 2, Block 1 PHA Apartments, G-7/2, Islamabad 44000, Pakistan. Tel.: +92 51 827 5611.

E-mail address: adnan@khans.org (A.A. Khan).

Both numbers of IDUs contacting a service (contacts) (Burrows, 2005, 2006a, 2006b; WHO, UNODC, & UNAIDS, 2007) and the number of syringes supplied (Sharma et al., 2007, 2008) have been used to determine coverage of IDU interventions. However 'contacts' are measured by number of visits over time and do not reflect the actual number of syringes exchanged by clients. This is crucial, as programmes with frequent contacts but insufficient syringe exchange under-perform (Heimer, 2008; Schechter et al., 1999). Interventions where the total need for new syringes is met by supply, have the potential to reduce HIV transmission amongst IDUs (Bluthenthal, Anderson, Flynn, & Kral, 2007; Heimer, Khoshnood, Bigg, Gyuish, & Junge, 1998; Heimer, 2008; Jones & Vlahov, 1998; Tempalski et al., 2008; Vickerman, Hickman, Rhodes, & Watts, 2006). The main disadvantage of this measure is that it is at population rather than at individual level and requires estimates of the total number of IDUs per city and their frequency of injecting, data which are not always available. Additionally, details about numbers or syringes supplied come from service providers, limiting the independence of such estimates. However, it is possible to independently verify supply by surveying IDUs. Despite the limitations, this methodology was used for measuring programme coverage in Pakistan. The National AIDS Control Programme (NACP) via its HIV/AIDS Surveillance Project (HASP) conducts annual rounds of surveillance, including estimates of the number of new syringes used and HIV prevalence amongst IDUs in major cities.

The optimal level of coverage needed to have an impact on an epidemic is not well understood. There is little evidence to support the recommendation that to control HIV transmission, coverage should exceed 60%, particularly when coverage is defined as at least one contact per month between IDU and service provider (WHO et al., 2007). Empirically, optimal coverage may vary from 25% to >60% depending upon factors such as the number of times IDUs share syringes with others, the size of injecting groups or networks, baseline HIV prevalence, syringe cleaning practises and access to syringes from other sources (Des Jarlais, Perlis, Arasteh, Torian, Beatrice, Milliken, et al., 2005; Des Jarlais, Perlis, Arasteh, Torian, Hagan, Beatrice, et al., 2005; Vickerman et al., 2006). Indeed even limited programme coverage may have some effect (Heimer, 2008). Conversely, some data suggest that over supplying syringes reduces sharing more quickly and effectively (Bluthenthal et al., 2007). Optimal levels of coverage required are likely to vary for individual cities and communities.

Ideally, intervention performance should be measured by a combination of assessment of impact, outcomes and coverage. However, data in Pakistan (and in other developing countries) are seldom sufficient to assess impact. Outcome data in terms of behaviour change are more readily available but may be inconclusive over shorter time periods. On the other hand, coverage when defined as the proportion of need that is met by the supply of new syringes is a practical measure to assess changes in behaviour as it indirectly measures the ability to (1) facilitate such behaviour change and (2) to supply these services, which in turn are crucial to sustain changed behaviour.

We present secondary analysis of data available from the national HIV/AIDS Surveillance (HASP). Programme implementation and financial inputs can be used to develop an analysis methodology that can routinely measure performance of IDU interventions in Pakistan and may be replicable elsewhere. Behaviour change is a point in time measure which can be examined annually or more frequently. Here, we used coverage as a measure of performance, defining this as the ability to induce desired behaviour change that results in the need for and use of new syringes and the ability of programmes to meet that need. A main aim of this study was to develop a methodology to measure programme performance in real time and with data that were readily available in the Pakistan and other developing countries.

Methods

Intervention programme data are available per quarter. Annual surveillance data map and estimate the number of IDUs in major cities and then use these estimates to develop the sampling frame for surveys of HIV prevalence and injecting and sexual behaviours. HASP methodology is described in detail elsewhere (National AIDS Control Programme of Pakistan & HASP, 2005, 2006, 2007; <http://www.nacp.gov.pk/library/publications>). As there were no HASP baseline data for two sites, Sargodha and Sialkot, we obtained data from a cross-sectional study that had used HASP sampling methodology and questionnaires (Nai Zindagi, 2006). Where data were available from multiple surveillance rounds, we used the most recent, which in most cases was between December 2006 and May 2007. NGO programme data were from June 2008.

Analyses performed

The following analyses were included: a cross sectional comparison between intervention and non-intervention cities of HIV prevalence and injecting and sexual risk behaviours; a comparison within each intervention site of HIV prevalence, risk behaviours and protective knowledge at baseline and ≥ 2 years into the intervention (HIV prevalence, average number of injections daily, always use of a new syringe, use of a "used" syringe with last injection, cleaning a used syringe prior to use and frequency of receiving new syringes from an NGO, sex with spouse or regular partner or paid sex with a man or a woman in the past 6 months, condom use during last sex act with a female partner and knowledge about HIV and its prevention); and finally, coverage estimates and a brief financial analysis were conducted.

Coverage calculation

Coverage was defined as the number of syringes supplied by the NGO as a proportion of total syringes needed. Syringe 'need' was calculated for both registered IDUs (all clients registered through the end of that quarter) and the total estimated number of IDUs for each city. Where available, HASP data¹⁻³ were used to provide the estimates of the number of IDUs, except for in Sialkot, where data from a research study using HASP methodology were used (Nai Zindagi, 2006). Syringe need was calculated by multiplying the total number of IDUs with the average number of daily injections as reported by the HASP survey.

Findings from the field interviews necessitated some modification of the 'need' calculation. First, most IDUs reported being unsure of syringe supply and typically injected twice with the same syringe, for example reusing their syringe at night when they had limited access to NGO workers. Second, IDUs reported injecting on about 25 days a month, due to drug availability or their own ability to procure drugs, often managing any withdrawal with non-injectable drugs including Diazepam. Based on these assumptions, the total need for syringes in a city was calculated as:

$$\text{Monthly syringe need} = \text{IDUs served} \times \text{average injection frequency} \times 25 \times 0.5$$

Coverage was then calculated by dividing the number of syringes provided by the need for syringes and this was expressed as a percentage. Additionally, total number of syringes used in a city was calculated by multiplying total estimated IDUs with mean injection frequency.

It is the policy of the NGOs to give out syringes to new IDUs in their jurisdiction for a few days after which these individuals must register with the service. An estimated 3–8% of all syringes

Table 1
Comparison of intervention and non intervention cities.

IDUs	City with intervention	City without intervention	Total	p
HIV prevalence	23%	12%	20%	<0.001
Been injecting drugs for (years)	9.18	9.41	9.31	0.731
Mean daily injections	2.3	2.1	2.3	<0.001
Always used a new syringe for drug injections in the past month	59%	27%	41%	<0.001
Used a "used needle" with last injection	12%	40%	28%	<0.001
Did you try and clean the last old needle you used	85%	63%	67%	<0.001
Last injection in a public place	85%	79%	82%	<0.001
Received new syringe/needle from NGO	59%	9%	31%	<0.001
Had sex with spouse within past 6 months	45%	46%	46%	0.611
Paid a female partner to have sex within past 6 months	20%	32%	27%	<0.001
Paid a man or Hijra to have sex within past 6 months	10%	16%	13%	<0.001
Used condom during last sex with a female partner	24%	11%	17%	<0.001
Knowledge: HIV is prevented by refraining from sex	60%	55%	57%	<0.001
Knowledge: using clean syringes prevents HIV	66%	43%	54%	<0.001
Knowledge: tested for HIV	7%	6%	6%	<0.001
Knowledge: know of an HIV prevention services provider	36%	27%	31%	<0.001
Availed any HIV prevention service	68%	33%	49%	<0.001

will have been distributed to non-registered IDUs. This may alter coverage calculations slightly.

In addition staff and clients of NGOs were interviewed about service delivery. Questions included examining the extent of other services used by NGO clients and the success or difficulties workers faced in delivering services such as outreach, counselling, and advocacy.

Peshawar and Quetta were excluded from coverage and cost analysis because their interventions served both injecting and non-injecting drug users, and their data did not track these groups separately.

Cost analysis

Information about total fund allocation for programmes was available from the World Bank, Pakistan office. We divided the total allocation for each NGO by the total number of client years served to determine their annual cost per client served. Once registered, each client was assumed to have been served by the NGO for the remainder of the project. Client-years served were calculated from client registrations for each quarter. For example, an IDU registered in year 1 received 5 years of service whereas one registered in year 4 received only 2 years. As levels of coverage and initial allocations varied between NGOs, we also adjusted for performance by dividing the annual cost per IDU with the area under the curve (AUC) of the coverage.

Since our study included secondary analysis of data from sources that had already obtained ethical approval, and because no personal information was used, no additional approval was sought for our study.

Table 2
Within city changes over time in intervention cities.

	Faisalabad		Lahore		Quetta		Karachi	
	2005 N (95% CI)	2006–7 N (95% CI)	2005 N (95% CI)	2006–7 N (95% CI)	2005 N (95% CI)	2006–7 N (95% CI)	2004 N (95% CI)	2006–7 N (95% CI)
HIV prevalence	13.3%	13.3%	3.8%	6.5%	9.5%	9.5%	26%	30%
Age	34 (17–51)	34 (19–49)	34 (19–49)	35 (19–51)	38 (18–59)	33 (17–49)	32 (15.99–48)	33 (17–49)
How long have you injected drugs (years)	13 (0–56)	13 (0–56)	10 (0–46)	6 (0–16)	17 (0–73)	6 (0–19)	19 (16–22)	6 (0–15)
How many times did you inject yesterday	2.6 (0.2–5)	2.6 (0.3–5)	3.2 (0–20)	2.7 (0–7)	5.7 (0–36)	1.6 (0–3)	2.4 (0–5)	1.6 (0–3)
Used a "used" syringe last time you injected	23%	22%	7%	8%	22%	18%	15%	9%
Did you clean the last used syringe you used	88%	94%	78%	94%	71%	44%	70%	60%
Received last syringe from NGO	35%	74%	74%	74%	0%	2%	71%	54%
Knowledge: ever heard of HIV/AIDS	76%	78%	90%	97%	91%	80%	65%	44%
Knowledge: can HIV/AIDS spread via sex	57%	80%	74%	82%	53%	92%	39%	98%
Knowledge: can HIV/AIDS spread via injections	33%	86%	21%	85%	32%	95%	31%	99%

Results

Comparison of intervention and non-interventions cities (Table 1)

National surveillance data from 2007 were used to compare cities with HIV interventions against those without. HIV prevalence was higher in cities with interventions (23% vs. 10%, $p < 0.001$). Mean daily injections in intervention cities were also slightly higher (2.3 vs. 2.1, $p < 0.001$), but more IDUs from intervention cities reported "always" using fresh syringes (59% vs. 27%, $p < 0.001$) and fewer reported using a "used" syringe with their last injection (12% vs. 40%, $p < 0.001$). They were also more likely to have cleaned "used" syringes prior to use and 59% had received syringes from an NGO.

Nearly half IDUs nationwide reported sex with their regular partner or spouse in the past 6 months; 20% from intervention cities and 32% from non-intervention cities reported paying a woman, man or a Hijra (male transgender) for sex and used condoms more often during sex with a woman.

IDUs from intervention cities had slightly higher levels of HIV prevention knowledge. There were no differences in HIV testing rates, which were very low in all cities. Twice as many IDUs from intervention cities (68% vs. 33%, $p < 0.001$) reported receiving some services from an NGO.

Change over time in intervention cities (Table 2)

HIV prevalence increased in Lahore and Karachi but remained unchanged in Faisalabad and Quetta. Median age of IDUs decreased in all cities as did the number of injections and duration of injecting,

Table 3
Coverage in individual cities. The NGOs in Balochistan provide services to injecting and non-injecting drug users and their records do not distinguish between the two and therefore could not be used for analysis of IDUs interventions.

	Karachi (NGO 1)	Karachi (NGO 2)	Lahore	Sargodha	Sialkot	Faisalabad
Programme started in (year)	June 2005	June 2005	January 2005	January 2005	January 2005	January 2005
IDUs estimated in surveillance	2500	3400	3350	2450	817 ^a	8030
Registrations	2712	2939	4733	3979	1581	4696
Syringes distributed per year	478,811	537,726	1,908,043	1,464,269	722,366	1,643,710
Anticipated syringe need						
By registered clients	1,367,250	1,163,484	2,717,416	6,020,101	833,125	2,400,368
By estimated IDUs	1,283,057	1,381,217	1,923,377	3,706,772	368,873	4,104,548
Based on behavioural data	1,244,197	1,256,907	1,769,507	3,324,975	36,887	3,222,070
Syringe need met						
By registered clients	35%	46%	70%	24%	87%	68%
By estimated IDUs	37%	39%	99%	40%	196%	40%
Proportion of current syringe usage being provided by the NGO	38%	51%	76%	27%	868%	87%

^a From research study: *The Lethal Overdose by Nai Zindagi* (2006).

except in Faisalabad. Use of a “used syringe” was low and generally declined from baseline, as did cleaning of used syringes. Except in Quetta, most IDUs reported receiving syringes from NGOs. In all cities duration of injecting and the mean number of daily injections dropped.

IDUs from Karachi, Lahore and Faisalabad reported few injections with “used” syringes. The proportion of IDUs receiving syringes from the NGO (30–75%) increased in Faisalabad, remained unchanged at 74% in Lahore and decreased in Karachi. Almost no IDUs from Quetta reported receiving syringes from the NGO. Reasons for this are unclear from available data.

Coverage and operations of individual projects

HIV interventions in Pakistan reach mainly street-based IDUs and became operational in 2004. Programmes are available in Lahore, Sargodha, Sialkot, Faisalabad, Karachi, Quetta and Peshawar. As noted, registration data from Quetta and Peshawar do not distinguish IDUs and non-IDUs. Coverage was calculated for the remaining 5 cities where 3 NGOs have a combined 20,640 clients. Using the proportion of syringe need that is met by the interventions as a measure of coverage, the overall coverage in these cities is about 66% of all registered clients and about 75% for all estimated IDUs, although there is wide variation between cities (Table 3).

Karachi was initially divided into 3 operational sectors. One NGO dropped out early and therefore only two-thirds of Karachi receives services. NGO 1 provides services in a part of Karachi which has an estimated 2500 IDUs. They had registered 2712 clients by June 2008. The NGO has established itself within the general community and operates from one drop-in centre and offices in middle class residential neighbourhoods, however, it reports spending considerable resources on community awareness and advocacy activities. It works well with the police, which allow it to operate for the most part. The NGO reports having distributed almost half a million syringes in 3 years from one drop in centre with about 30 outreach workers (ratio: 90 IDUs/ORW). It tracks syringe returns, often making these a condition for providing new syringes and reports that over 96% of used syringes are recovered. The NGO meets about 35% of the need for syringes by IDUs and supplies about 38% of the total estimated syringes used by IDUs in their area of operation (Table 3).

By June 2008 the NGO had performed VCT for about 1200 individuals, including about 20% repeat tests. The testing is conducted off-site at a government facility. The nearly 300 HIV+ IDUs identified via testing are registered with government funded HIV care centres and are helped by the NGO to receive government provided free HIV care including antiretrovirals. In the past 3 years, the NGO has provided non-pharmacological detoxification and reha-

bilitation to over 850 clients and feels that this is one of the most sought-after services. In addition it has distributed almost 42,000 condoms amongst its clients.

Another NGO, serving a different part of Karachi with an estimated 3400 IDUs, has registered 2939 clients over a similar time period. It provides services via 3 drop-in centres, using 31 outreach workers (95 IDUs/ORW) and one mobile van. It has distributed over half a million syringes and is meeting about 46% of the total syringe need of registered clients in the latest quarter of operation, corresponding to about half of all syringes that are used by the IDUs in the service area. They too have advocated for their position in the community and with the police and spend considerable resources on community activities. The NGO has provided VCT to 560 clients with none to date testing HIV+ (Table 3).

One NGO serves IDUs in Lahore, Faisalabad, Sargodha and Sialkot and has registered 14,595 IDUs (HASP estimates for these cities are 14,530 IDUs – Table 4). It covers 63% of the need for syringes for all estimated IDUs across these cities and about 56% for all its registered clients.

In Lahore, the NGO reports registering over 4700 clients compared to HASP estimates of 3350 and meets 70% of its registered clients' syringe needs. Operations in other cities started several months after Lahore. The one in Sargodha has registered 3979 IDUs (compared to surveillance estimates of 2450) and covers about 61% of the need based on IDUs registrations and 99% by surveillance estimates. The Sialkot intervention has 1581 clients compared to the NGO's original estimates of 700 (the city was never surveyed by HASP). It meets 40% of the syringe need. The Faisalabad intervention has registered about 4700 clients in 32 months compared to surveillance estimates of 8030 and reports that it cannot find more IDUs in the city. It meets 70% of the need from all its registered clients and supplies 90% of the syringes used by IDUs. With the exception of Lahore, most operations are via outreach only (via motorcycles and a mobile unit) with 104 IDUs/ORW.

The NGO started VCT in 2007 and has tested nearly 2000 IDUs. Most are first time tests and nearly 400 IDUs have tested positive. Testing is done in-house with rapid tests using standard WHO protocols. Those identified as having HIV are referred to government HIV care centres. The NGO also provides drug and vocational rehabilitation services to about 70–100 IDUs at any given time. Finally it reports good working relations with communities and the police, except in Sialkot where police operations have occasionally disrupted services.

Nationwide coverage

Very little is known about the numbers of home-based or female IDUs. HIV interventions focus only on male, street-based IDUs.

Table 4
Current levels of coverage.

	HASP projected IDUs	IDUs registered by NGOs	Percent registered	Syringes needed per quarter	Syringe supplied last quarter	Coverage
In large urban centres only						
Punjab	22,011	14,989	68%	2,096,531	759,441	36%
Sind	13,750	5651	41%	974,531	157,054	16%
NWFP	339	125	37%	20,354	525	3%
Balochistan	221	550	249%	12,419	25,500	205%
Nationwide	36,321	21,315	59%	3,103,835	942,520	30%
Total estimated IDUs						
Nationwide (urban and rural)						
Punjab	57,353	14,989	26%	5,462,886	759,441	14%
Sind	23,818	5651	24%	1,688,085	157,054	9%
NWFP	1322	125	9%	79,344	525	1%
Balochistan	734	550	75%	41,276	25,500	62%
Nationwide	83,227	21,315	26%	7,271,591	942,520	13%

Extrapolations of the national surveillance data (Table 4) were used for provincial and national level coverage calculations and these include all estimated rural and urban IDUs. However, the interventions are currently operating in a few large cities with 30% coverage (in all large cities combined). It would be around 13% for all rural and urban IDUs, suggesting the need to scale up interventions across the country.

Cost of interventions

Allocations per client served vary considerably across the country. Operations cost USD 403 per year per client in Punjab and around USD 124–146 in Karachi, with little difference in actual services offered. These costs of operation increase further when adjustments are made for performance (Table 5). Quetta and Peshawar interventions were excluded from these analyses as IDU client registration data were unavailable.

Discussion

Analysis of surveillance, research and programme data shows that IDU interventions in Pakistan have reduced HIV risk and provide >50% coverage in the cities where they operate. Despite working in a conservative country, most programmes have successfully integrated into their host communities and work well with law enforcement agencies and the government, which funds these projects. However, the interventions are expensive, raising concern for resource efficiency and sustainability; they operate in only a few cities with national coverage of 13% and 30% in large cities and have not improved HIV prevalence in most cities.

Coverage and implementation issues

Syringe coverage varied between 24% and 87% in intervention cities and reaches 20,640 IDUs. Given that most of these cities had no interventions before 2004, Pakistan's experience suggests

that the necessary implementation skills can be developed and interventions can be scaled rapidly. However, only 7 of 22 cities nationwide with populations over 200,000 have interventions for IDUs (Table 1) corresponding to about 30% coverage in major cities and about 13% nationwide for all urban and rural locations. More concerning is the fact that HIV prevalence has not decreased in intervention cities. This may be due to the short duration of interventions; however, no means exist to measure impact of these services in real time.

A number of factors have influenced coverage and impact. In all cities, the age of injectors either remained constant or dropped (Table 2). Surveillance data show that around 30% of IDUs move annually between cities (National AIDS Control Programme & HIV/AIDS Surveillance Project, 2008). Together these data suggest a moderate influx of younger IDUs towards services, which may explain the static or increasing HIV prevalence. Younger IDUs may increase the costs of services by requiring more intensive counselling and otherwise diminish efficacy by not integrating with services or with existing IDU communities.

NGOs devote considerable financial and human resources to raising community awareness and advocacy activities or to social services for IDUs, which may contribute indirectly to HIV prevention by allowing programmes to operate or draw IDUs to services. Indeed, within country examples suggest that effective advocacy and support services can be the difference between a well functioning and a struggling project. However, their utility is only to the extent that they promote new syringe and condom use or allow programmes to operate without objection. The added value of HIV prevention funds allocated to these social/community activities must be evaluated in terms of their ability to reduce HIV transmission. Outreach is critical and yet NGOs have one outreach worker for about 90–105 clients, choosing instead to rely on drop-in centres, which are necessary for services such as VCT, primary health and wound care. However, most cities with interventions are geographically large and since some IDUs will not come to drop-in centres or do so infrequently, only a limited number of IDUs can be reached by

Table 5
Cost of interventions.

	Total clients registered	Total clients-years served ^a	Total fund allocation for the project (USD)	Annual cost per client served (USD)	Annual cost – adjusted for performance (USD) ^c
Lahore, Faisalabad, Sargodha and Sialkot	14,989	24,274	7,952,100	403	523
Karachi 2 ^b	2712	6430	600,000	146	261
Karachi 3 ^b	2939	5969	600,000	124	349

^a Assumes that a client once registered continued to receive services through the duration of the project.

^b The NGO working in Karachi 1 stopped operations early and is therefore not assessed.

^c Performance adjustment was calculated by dividing the annual per client cost with the area under the curve (AUC) of coverage. If the NGO showed >100% coverage (over supply of syringes) for any quarter, the coverage was capped at 100% for that quarter for AUC calculation; Pakistan Rupee (PKR) to (US Dollar USD) conversion done at the 2008 levels of rate of exchange, i.e. PKR 60 to 1 USD.

centres alone. The low IDUs to outreach worker ratio often means that syringes are supplied with little time for counselling. International experience suggests that this may be insufficient to curtail HIV transmission (Schechter et al., 1999; Strathdee et al., 1997). Other services such as voluntary counselling and testing, which help identify HIV+ individuals, are a relatively new experience for most Pakistani NGOs. With one exception, NGOs rely on offsite testing in regular government hospitals which has deterred IDUs from participating. The current experience of using rapid tests with immediate feedback of results to clients must be scaled up to reach more IDUs and be part of regular operations.

Costs

Whilst service coverage and possibly standards may be reasonable, the overall costs, particularly when adjusted for performance, remain high compared to region and international experience. Similar services cost around USD 62 in Nepal, USD 97 in India and USD 258 in Estonia, with Georgia, Russia and Uzbekistan falling within this range (Stover, 2008) as do estimates of idealised models for Pakistan which cost USD 135–180 (Alban, Hansen, Fatima, & Nielsen, 2007; Khan and Khan, 2010a, 2010b). By comparison, the actual costs of Pakistani NGOs are high and may be even higher since the current cost estimates are based on registered clients, all of whom are unlikely to continue receiving services routinely and regularly. Some of this high cost may reflect services to non-IDUs or unregistered IDUs, however these IDUs are few and cost diversions would be minor. It seems that there is considerable room to rationalise management costs by NGOs (Alban et al., 2007; Khan and Khan, 2010a, 2010b). This is important since on the one hand there is a global and national underfunding of IDU programmes, on the other hand funds that are allocated for IDUs are inefficiently used, further limiting the programming that is possible. Finally, inefficient use of resources also undermines confidence amongst funders.

Potential for results based monitoring

At the moment much of the monitoring of IDUs interventions in Pakistan is based on inputs such as the funds used, personnel trained and clients registered. NGOs augment their records with high profile community awareness events which do not reduce harm directly. Prevalence and behaviour change assessments are possible from surveillance but are often too slow to guide changes in interventions. We demonstrate that an analyses of supply and need for syringes using surveillance and verified programme data about service use may form the basis for real time monitoring of outcomes (behaviour change leading to actual syringe use). This analysis may be produced at quarterly intervals, allowing both the implementers and their funders to track progress in real time, make timely changes when indicated or even use actual results to pay for performance. We understand that such national data are seldom as “clean” as study or trial data but more often than not, these are the only data available in developing countries. However, active use of such data is likely to lead to improvement in their quality.

Limitations

Definitions of IDUs vary from all those seeking injection related services to any injections within past 6 months or one year. The HASP includes only those IDUs who have injected within the past 6 months. Whilst these definitions may yield slightly different estimates of IDUs, a national study of 4000 IDUs showed that, an IDU who injected yesterday was 90% likely to have been injecting 6 or 12 months (UNODC Anti-Narcotics Force, 2007). Thus any varia-

tions in IDU estimates and their bearing on our study findings are likely to be small.

We used the number of target beneficiaries served as the primary units of analysis. As NGOs do not report individual contacts with each client, we used both estimates of IDUs from national surveillance as well as clients registered by NGOs. Neither accurately depicts the actual number of clients availing services daily. HASP estimates have yet to be validated for accuracy and NGO registrations overestimate IDUs since NGOs register many more clients than they serve regularly. This must be addressed by requiring more comprehensive records of service provision from the providers and by including more specific questions about service use in surveillance.

Based on field interviews we assumed that IDUs will inject 25 days a month and will use one syringe for 2 injections – for themselves, even when they do not share. As NGOs improve their practises, these numbers must change to a one syringe one injection paradigm and surveillance should include accurate assessments of non-injecting days. We verified NGO reports of syringes supplied with limited field interviews with IDUs; it would be useful to develop a more formal mechanism for independently validating use of syringe exchange and other services. NGOs and national surveillance reach only male, street-based IDUs. Compared to the international experience (Heimer, Barbour, Shaboltas, Hoffman, & Kozlov, 2008; Nabatov et al., 2007; Tempalski et al., 2008) estimated number of IDUs in Pakistan may be too low, reflecting the absence of females or IDUs injecting at home or in private spaces. NGOs claim that at home injectors may be at a low risk, however, there is no empirical evidence to support this claim.

Unit cost calculations are based on client registrations. Since it is unlikely that all clients continue to receive services regularly once registered, it is likely that the actual costs may actually be much higher. Additionally, we counted 1 syringe towards 2 injections; actual usage may vary from this happening each time to never, thus changing cost calculations by a factor of 2. The actual costs of services may vary from our estimates considerably. However, under the circumstances these are based on the best data available and are comparable to many developing countries.

Finally, we performed secondary analysis on nationally available data from surveillance and programmes. This is first time surveillance and programme data have been used in this way in Pakistan. We have noted some issues about the quality of data and some time trends that appear difficult to explain (e.g. duration of injecting in Karachi), however, as with any data, its accuracy will increase the more it is used.

Based on our findings, we recommend that coverage of services must be enhanced to reach IDUs in other cities at risk, especially since experience thus far proves that rapid scale up is achievable. Whilst these services are cost-effective based on international data, the costs of Pakistani programmes must be rationalised. Components such as sufficient outreach, scaled up VCT using rapid tests and incorporation of pharmacological substitution therapy remain a major gap and must be addressed. We are proposing a method for measuring results of interventions using data that are currently available in the country to guide programmes in real-time. These data include surveillance, NGO outputs and services used by IDUs. Our study therefore highlights the value of secondary analysis of the rich currently available data to understand nuances of programming. However, there is an urgent need to develop means to independently verify each of these data sources in order to enhance their objectivity (although regular usage would also improve the quality of these data). New research should focus on programmatic needs for scale up, validation of existing data and specifics of IDU practises such as how they manage limited syringe supply and what happens on days when they do not have access to drugs.

Contributors

AAK has worked as a consultant for the World Bank (this study), the National AIDS Control Programme, the Canadian International Development Agency (to design the next phase of the national HIV surveillance system in Pakistan) and for the NGO: Nai Zindagi (the development of their VCT program). He works at the company Research and Development Solutions; and is currently a consultant to the Ministry of Health and the USAID as Policy Advisory at the National Health Systems and Policy Unit.

AK has worked for the National AIDS Control Programme and the Health Policy Unit at the Ministry of Health. She is currently working at the Research and Development Solutions, a private sector research, analysis and advocacy company.

AAK performed the field interviews and data collation. Both AAK and AK performed analyses and authored the manuscript.

We are indebted to Dr. Samuel Friedman (NDRI, New York, USA) for his comments on and critique of this manuscript.

Acknowledgment

The funding for this study was provided by the World Bank, Pakistan Office.

Conflicts of interest: There are no conflicts of interest.

References

- Alban, A., Hansen, D. H., Fatima, M., & Nielsen, S. (2007). Cost-effectiveness of drop-in-centres to prevent HIV among injecting drug users, IDUs, in Karachi, Pakistan. *SSRN eLibrary*.
- Bluthenthal, R. N., Anderson, R., Flynn, N. M., & Kral, A. H. (2007). Higher syringe coverage is associated with lower odds of HIV risk and does not increase unsafe syringe disposal among syringe exchange program clients. *Drug Alcohol Depend*, 89(2–3), 214–222. Epub 2007 Feb 5.
- Burrows, D. (2005). *High coverage of harm reduction services among IDUs: Selected results and ways of measuring syringes UN experts group meeting*.
- Burrows, D. (2006a). Advocacy and coverage of needle exchange programs: Results of a comparative study of harm reduction programs in Brazil, Bangladesh, Belarus, Ukraine, Russian Federation, and China. *Cadernos de Saude Publica*, 22, 871–879.
- Burrows, D. (2006b). Rethinking coverage of needle exchange programs. *Substance Use and Misuse*, 41, 1045–1048.
- Des Jarlais, D. C., Perlis, T., Arasteh, K., Torian, L. V., Beatrice, S., Milliken, J., et al. (2005). HIV incidence among injection drug users in New York City, 1990 to 2002: Use of serologic test algorithm to assess expansion of HIV prevention services. *American Journal of Public Health*, 95, 1439–1444.
- Des Jarlais, D. C., Perlis, T., Arasteh, K., Torian, L. V., Hagan, H., Beatrice, S., et al. (2005). Reductions in hepatitis C virus and HIV infections among injecting drug users in New York City, 1990–2001. *AIDS*, 19(Suppl. 3), S20–S25.
- Heimer, R. (2008). Community coverage and HIV prevention: Assessing metrics for estimating HIV incidence through syringe exchange. *International Journal of Drug Policy*, 19(Suppl. 1), S65–S73.
- Heimer, R., Barbour, R., Shaboltas, A. V., Hoffman, I. F., & Kozlov, A. P. (2008). Spatial distribution of HIV prevalence and incidence among injection drugs users in St Petersburg: Implications for HIV transmission. *AIDS*, 22, 123–130.
- Heimer, R., Khoshnood, K., Bigg, D., Guydish, J., & Junge, B. (1998). Syringe use and reuse: Effects of syringe exchange programs in four cities. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 18(Suppl. 1), S37–S44.
- Jones, T. S., & Vlahov, D. (1998). Use of sterile syringes and aseptic drug preparation are important components of HIV prevention among injection drug users. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*, 18(Suppl. 1), S1–S5.
- Khan, A. A., & Khan, A. (2010a). *Design of an IDU and HIV national program*. International Harm Reduction Association.
- Khan, A. A., & Khan, A. (2010b). The HIV epidemic in Pakistan. *The Journal of the Pakistan Medical Association*, 60, 300–307.
- Nabatov, A. A., Masharsky, A. E., Verevchkin, S. V., Emelyanov, A. V., Lukashov, V. V., Heimer, R., et al. (2007). The rate of epidemiological and virological changes during the transition from nascent to concentrated HIV epidemic stage in the former Soviet Union countries. *AIDS Research and Human Retroviruses*, 23, 183–192.
- Nai Zindagi. (2006). *The lethal overdose*.
- National AIDS Control Programme & HIV/AIDS Surveillance Project Control Programme. (2008). *HIV/AIDS surveillance project of Pakistan: Round 3*.
- National AIDS Control Programme of Pakistan & HASP. (2005). *HIV/AIDS surveillance project of Pakistan: Pilot round*.
- National AIDS Control Programme of Pakistan & HASP. (2006). *HIV/AIDS surveillance project of Pakistan: Round 1*.
- National AIDS Control Programme of Pakistan & HASP. (2007). *HIV/AIDS surveillance project of Pakistan: Round 2*.
- Schechter, M. T., Strathdee, S. A., Cornelisse, P. G., Currie, S., Patrick, D. M., Rekart, M. L., et al. (1999). Do needle exchange programmes increase the spread of HIV among injection drug users?: An investigation of the Vancouver outbreak. *AIDS*, 13, F45–F51.
- Sharma, M., Burrows, D., & Bluthenthal, R. (2007). Coverage of HIV prevention programmes for injection drug users: Confusions, aspirations, definitions and ways forward. *International Journal of Drug Policy*, 18, 92–98.
- Sharma, M., Burrows, D., & Bluthenthal, R. N. (2008). Improving coverage and scale-up of HIV prevention, treatment and care for injecting drug users: Moving the agenda forward. *International Journal of Drug Policy*, 19(Suppl. 1), S1–S4.
- Stover, J. (2008). *Review of the unit costs of HIV prevention and treatment in Pakistan the futures institute*.
- Strathdee, S. A., Patrick, D. M., Currie, S. L., Cornelisse, P. G., Rekart, M. L., Montaner, J. S., et al. (1997). Needle exchange is not enough: Lessons from the Vancouver injecting drug use study. *AIDS*, 11, F59–F65.
- Tempalski, B., Cooper, H. L., Friedman, S. R., Des, J., Brady, J., & Gostnell, K. (2008). Correlates of syringe coverage for heroin injection in 35 large metropolitan areas in the US in which heroin is the dominant injected drug. *International Journal of Drug Policy*, 19(Suppl. 1), S47–S58.
- UNODC Anti-Narcotics Force. (2007). *The problem drug use in Pakistan*.
- Vickerman, P., Hickman, M., Rhodes, T., & Watts, C. (2006). Model projections on the required coverage of syringe distribution to prevent HIV epidemics among injecting drug users. *Journal of Acquired Immune Deficiency Syndrome*, 42, 355–361.
- WHO, UNODC, & UNAIDS. (2007). *Guide to starting and managing needle and syringe programmes*.