The size and distribution of key populations at greater risk of HIV in Pakistan: implications for resource allocation for scaling up HIV prevention programmes

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ABSTRACT

Background With competing interests, limited funding and a socially conservative context, there are many barriers to implementing evidence-informed HIV prevention programmes for sex workers and injection drug users in Pakistan. Meanwhile, the HIV prevalence is increasing among these populations across Pakistan. We sought to propose and describe an approach to resource allocation which would maximise the impact and allocative efficiency of HIV prevention programmes.

Methods Programme performance reports were used to assess current resource allocation. Population size estimates derived from mapping conducted in 2011 among injection drug users and hijra, male and female sex workers and programme costs per person documented from programmes in the province of Sindh and also in India were used to estimate the cost to deliver services to 80% of these key population members across Pakistan. Cities were prioritised according to key population size.

Results To achieve 80% population coverage, HIV prevention programmes should be implemented in 10 major cities across Pakistan for a total annual operating cost of approximately US$3.5 million, which is much less than current annual expenditures. The total cost varies according to the local needs and the purchasing power of the local currency.

Conclusions By prioritising key populations at greatest risk of HIV in cities with the largest populations and limited resources, may be most effectively harnessed to quell the spread of HIV in Pakistan.

INTRODUCTION

Pakistan's HIV epidemic is concentrated among key populations at greater risk of HIV. In 2011, the HIV prevalence was estimated to be 37.8% among injection drug users (IDUs), and 7.2%, 3.1% and 0.8% among hijra (transgender; HSW), male (MSW), and female (FSW) sex workers, respectively.[1] These HIV prevalence estimates are considerably higher than those of the general population (0.1%)[1] and of pregnant women attending antenatal clinics (0.05%).[2] Given the observed trajectory of the HIV epidemic among these key populations[1 3] (figure 1), evidence of potential injection and sexual routes of transmission between IDUs and sex workers, and alarming model projections of prevalence surpassing 70% among IDUs by 2025 in some cities and continuing to increase among sex workers,[4] it has become apparent that the window of opportunity to prevent HIV from exploding within IDU populations and becoming firmly established among sex workers and clients may be closing.[5] It is therefore imperative to implement effective HIV prevention programmes targeting key populations at high population coverage in Pakistan, and with consideration given to HIV transmission dynamics[6–9] within geographically defined areas. Priorities include surveillance, analysis of data, investments in prevention and interventions implemented at high population coverage (table 1).

The Government of Pakistan has indicated its commitment to reducing HIV transmission, and is a signatory to the United Nations Development Programme's Millennium Development Goals, whereby one of the goals is to 'halt and begin to reverse the HIV/AIDS epidemic by 2015'.[10]

National-level HIV prevention priorities, resource allocation and implementation strategies are described in the strategic plans prepared and published by the National AIDS Control Program (NACP), and the progress reports to the United Nations General Assembly Special Session on HIV/AIDS.[11–14] Since 1986, the national response to HIV/AIDS in Pakistan (figure 2) has been led by NACP, with Provincial AIDS Control Programs (PACPs) largely responsible for implementation, much of which takes place through non-governmental organisations (NGOs).[15] [16] Coordinated global efforts for HIV prevention prompted the Government of Pakistan to develop its 5-year National Strategic Framework (NSF-I) with UNAIDS support in 2001, which set priorities and aimed to establish a multisectoral response.[17] This led to the Enhanced HIV/AIDS Control Program (EHACP) for a 5 year period with financial support from the World Bank, the UK Department for International Development (DFID), and the Canadian International Development Agency (CIDA), with an overall focus on HIV prevention among key populations. The national response was reviewed in 2006, and the Second National Strategic Framework (NSF-II) was developed for 2007–2011[14] with a total budget of US$99.4 million from the World Bank, DFID and the Government of Pakistan described in the Planning Commission Document 1 (PC-1) of the EHACP. PC-1s describe the programme plan and budget for the subsequent 5 years, and are approved by the executive committee of the National Economic Council (Pakistan). Pakistan also received funding
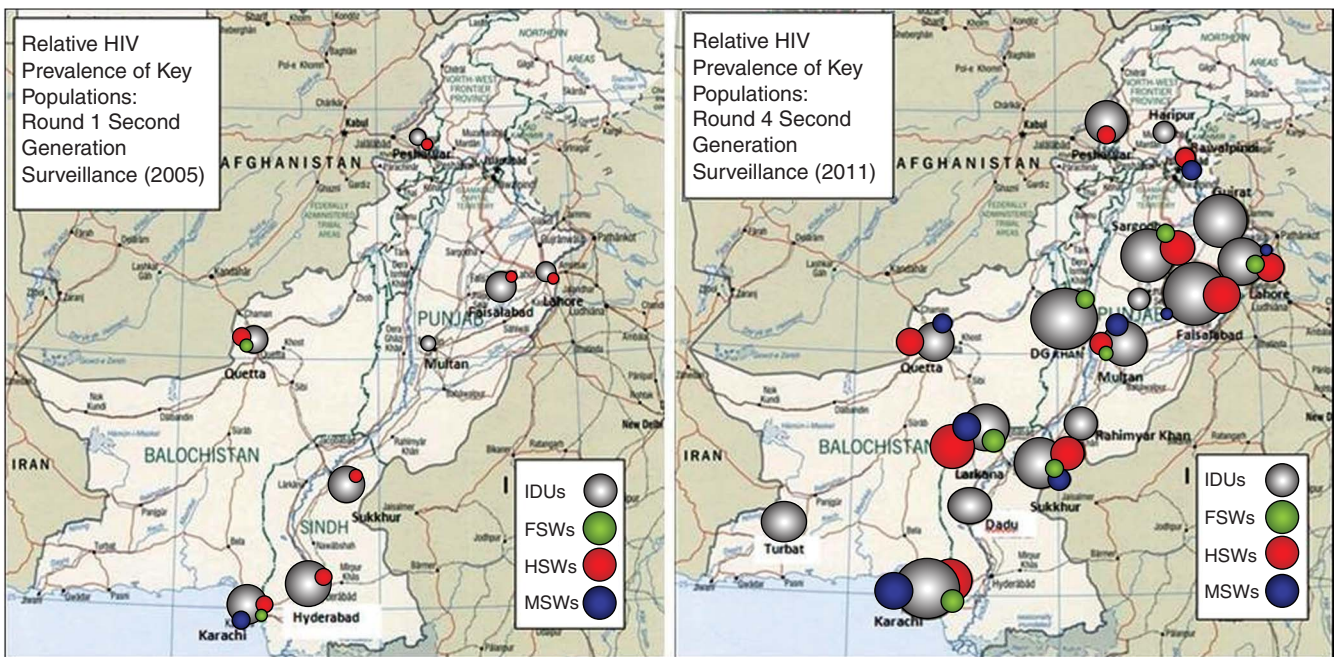
Figure 1 Relative HIV prevalence in various cities in Pakistan, 2005 and 2011. FSW, female sex workers; HSW, hijra sex workers; IDU, injection drug users; MSW, men sex workers.

from The Global Fund to Fight AIDS, tuberculosis and malaria to scale up prevention and treatment, care and support services for IDUs. Due to devolution of the ministry of health, the provinces are developing their own HIV prevention strategies which will form the Pakistan AIDS Strategy (PAS-III 2012–2016).[11]

By the end of 2009, HIV/AIDS interventions reached more than 30 000 IDUs, 25 000 MSW/HSWs, 12 000 FSWs and 50 000 long-distance truckers. According to the National AIDS Spending Assessment, a total of US$34.19 million was spent in 2008 and 2009.[12] For fiscal year 2009–2010, it was reported that 43% of HIV/AIDS funds were spent on prevention, with another 38% spent on programme management.[11] Within the prevention category, the majority of the ~US$5.7 million in funding was spent on harm reduction activities among IDUs and their partners (US$3.8 million), sex workers (~US$0.8 million), with the remainder spent on prevention among

'vulnerable and accessible populations', men who have sex with men (MSM), blood safety and behaviour change communication.[11] Pakistan's 2010 UNGASS report presents how US$13.88 million were allocated for HIV prevention among specific population groups over two fiscal years (2008–2009 and 2009–2010). According to this breakdown, 54% was spent on IDUs, 21.6% spent on FSWs, 11% spent on MSW/HSWs and the remaining 13.3% (US$1.85 million) was spent on jail inmates, truck drivers and women and their partners.[12]

Although there have been efforts to implement a comprehensive multisectoral approach for the prevention and treatment of HIV in Pakistan, there have been significant barriers to implementation, including conflict and insecurity, funding gaps, competing priorities and lack of capacity.[11] [18–20] This has undermined Pakistan's political commitment to HIV prevention, and has coincided with an increasing HIV prevalence. Moreover, the prevailing conservative social norms render the provision of services and protection of rights for marginalised populations, particularly those related to HIV prevention, politically unfavourable.[20] This challenging context has been further exacerbated by the devolution of Pakistan's Ministry of Health in June 2011 as part of the 18th constitutional amendment,[21] and natural disasters, such as the 2010 floods which killed more than 2000 people and internally displaced nearly 2.5 million more, resulted in substantial reallocation of funds from EHACP.[22] Now, in the context of devolution, the provinces are engaged in a process to redefine their roles. With the prospect of a rapidly spreading epidemic among key populations, there is an urgent need to re-engage and redefine efforts for HIV prevention. With its wealth of data gathered among key populations through the Canada–Pakistan HIV/AIDS Surveillance Project (HASP) from 2004 to 2011, Pakistan is well positioned to design a comprehensive and evidence-based HIV prevention programme.

In this paper, we provide an assessment of the prevention initiatives undertaken to date, and present estimates of the cost to implement comprehensive HIV prevention programmes at high coverage in cities across Pakistan.

Table 1 Priorities for the concentrated HIV epidemics of Pakistan

| Factor	Priorities
Priorities needed for surveillance, monitoring and evaluation	Emphasis on biological and behavioural surveillance of key populations (male, female and *hijra* sex workers and injection drug users)
Analysis	HIV prevalence, mapping, population-size estimation, behavioural interactions within key populations and between groups, and their sexual or injecting partners
Investments	Invest in surveillance, targeted interventions for key populations, and stigma-reduction campaigns for the general population
Interventions	Goal is saturation coverage of key populations
Key research questions	How to reach key populations with high coverage of high-quality targeted interventions

Adapted from David Wilson and Daniel T Halperin.[9]

Emmanuel F, *et al. Sex Transm Infect* 2013;**89**:ii11–ii17. doi:10.1136/sextrans-2013-051017
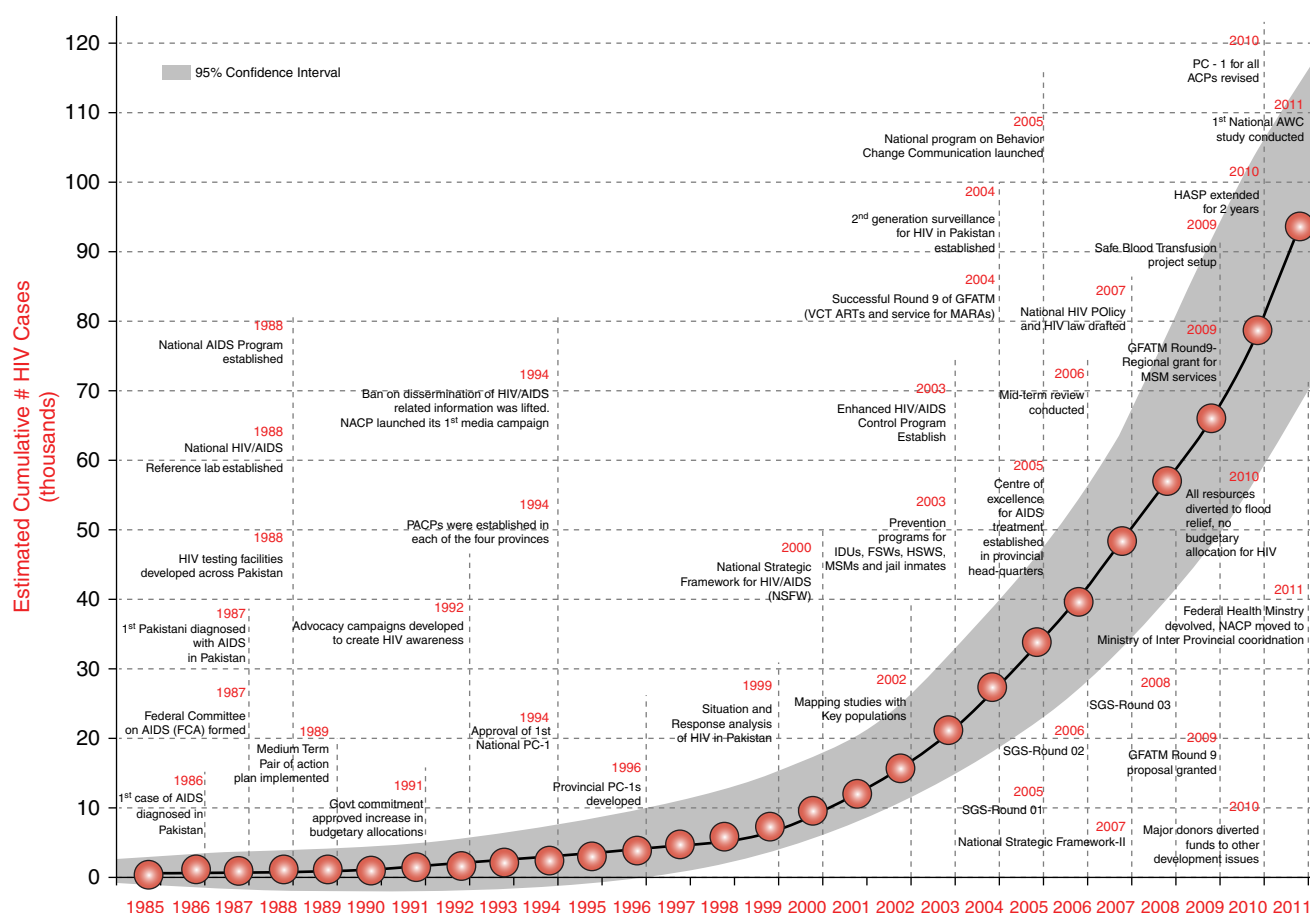
Figure 2 Number of reported HIV cases in Pakistan, and Pakistan Government's response to HIV from 1985 to 2011.

METHODS

Population size estimates

Mapping data collected as part of the Canada–Pakistan HIV/AIDS Surveillance Project between March and September 2011[8] was used to locate, enumerate and characterise populations of IDUs and female, male and *hijra* sex workers in each of the cities included in the mapping. In mapping, secondary key informants, such as taxi drivers, were interviewed to identify locations where members of these key populations congregate. This step is followed by interviewing key population members themselves to get more detailed information about locations. The cities in which mapping was conducted are considered to be the most important cities in terms of presence and size of key populations. Data collection and analysis as part of HASP was approved by the institutional ethical review boards of HOPE International in Pakistan and the Public Health Agency of Canada. Our approach identified priority cities across Pakistan in which to implement targeted HIV prevention programmes for particular key populations in order to achieve high programme coverage.

Program cost estimates

We used two methods to convert the costs to US dollars: the effective exchange rate and the purchasing power-adjusted exchange rate. Actual costs to implement service delivery programmes for these key populations in Sindh Province[23] in 2009 were used to calculate an estimated cost to achieve 80% programme coverage, according to the population size estimates derived from the 2011 round of mapping and surveillance. We include these estimates for 80% population coverage because impact evaluations of programmes in India with coverage at this level have shown a reversal of the epidemic among FSWs, clients and the general population.[24 25] The 2009 annual cost of Pakistani rupees 1675 (PKR; 2011, US$21.14) for each female sex worker, and 1450 PKRs (2011 US$18.30) for each male or *hijra* sex worker was used for this calculation. This cost includes six visits to a primary health clinic, sexually transmitted infection treatment costs, 240 condoms, 12 visits with a peer educator, and costs to train programme staff, conduct a baseline survey and annual evaluation, and 25% management charges for the NGO host. The annual cost of 2875 PKRs (2011 US$36.28) per IDU includes 12 visits to a primary health clinic, 300 disposable 5cc syringes with a needle, STI treatment costs, 50 condoms, 12 visits with a peer educator, and costs to train programme staff, conduct a baseline survey and annual evaluation, and 25% management charges for the NGO.

Cost sensitivity analysis

A sensitivity analysis was conducted using different per-client programme cost estimates. Programme cost data from India were used to calculate alternative costs for HIV prevention for key population members in the same cities of Pakistan. To facilitate comparison, all costs were converted to 2011 currency values using the real effective exchange rate index, and then converted to US dollars using 2011 purchasing power-adjusted market exchange rate conversion factors.[26 27] The 1 January 2011 exchange rates used were PKR85.61, and `44.7. The

2011 purchasing power-adjusted market exchange rate conversion factors used were 37.17 and 19.67, for Pakistan and India, respectively.

The annual budgeted costs to deliver targeted interventions in India in 2007 (including office infrastructure, programme management and programme delivery) were `1800 (2011, US $41.30) per FSW, `1850 (2011, US$42.45) per MSM and `2900 (2011, US$66.54) per IDU.[28]

RESULTS
High population coverage for a strategic response to Pakistan's concentrated HIV epidemics

Key population size estimates derived from the mapping conducted in 2011 indicated 46 351 IDUs in the 19 cities included in the mapping, 42 436 MSWs and HSWs in 14 cities, and 89 178 FSWs in 15 cities included in the mapping. The estimated size of each population in each city is provided in table 2.

Previous evidence has suggested that 80% key population programme coverage may effectively stem HIV transmission among sex workers, clients and the general population.[24] [25] This may be approached in two ways: by reaching 100% of key population members in 80% of the cities in which these key population members live, or to reach 80% of key population members in all the cities in which they live. By applying the first approach to the cities included in this study, programmes would only have to be implemented in 10 cities to reach 80% of the population. Faisalabad, Hyderabad and Lahore were included in the prioritised cities for all three key population groups and should, therefore, have programmes targeting all three groups. Based on the system of prioritising the cities with 80% of the key population members, programmes targeting two of the key populations should be implemented in Karachi (IDU and MSW/HSW), Sukkur (IDU and MSW/HSW), Multan (FSW and MSW/HSW), and Quetta (FSW and MSW/HSW). Finally, programmes targeting one key population should be implemented in Nawabshah (IDU), Peshawar (IDU), and Sargodha (FSW) to achieve 80% population coverage, for a total annual cost of US $3.5 million (US$8.06 million adjusted for purchasing power) (table 2).

By population group, this is an annual cost of US$1.36 million (11.6 crore Pakistani rupees) for IDUs, US$625 248 (5.4 crore rupees) for MSW/HSW, and US$1.51 million (12.9 crore rupees) for FSWs (table 2). This represents a proportional allocation of 39% to IDU programmes, 18% to MSW/HSW programmes, and 43% to FSW programmes.

The Pakistan and India rupee are particularly undervalued in relation to the US dollar, resulting in the large change in the cost estimate upon adjusting for purchasing power. Incorporating the purchasing power adjustment to the cost estimates derived from three different countries effectively eliminates differences in the purchasing power of their respective currencies, rendering these cost estimates comparable.

DISCUSSION

Pakistan is to be commended for its HIV surveillance programme (2004–2011), its efforts to provide services to key populations despite complex social and political challenges, and recent changes to its prevention targets to reflect the reality of a concentrated epidemic by prioritising prevention among key populations. Pakistan is rare in terms of its wealth of scientific data available which could be used to better set priorities. We have a rich understanding of the key populations, the current distribution of HIV infections, and the behaviours that drive transmission. Pakistan's HIV epidemic is concentrated among

key populations, with geographic heterogeneity, very few infections in the general population, and modelling results project an increase in HIV prevalence if current trends continue.[4] In this epidemiological context, HIV prevention programmes should target IDUs and male, *hijra* and female sex workers at high population coverage.[9] Although the prevalence is relatively low among sex workers, the prevalence was close to zero until recently, suggesting that HIV may have recently been introduced to sex work networks.[1] Considering the behavioural risks and large size of sex worker populations, there is significant potential for rapid transmission of HIV within these networks, and it is therefore imperative to rapidly implement HIV prevention interventions for sex workers and IDUs. Given the present economic and development situation, it is essential that available resources are put to optimal use.

Considering key population sizes in Pakistan's major cities, and the costs to implement these services in Pakistan, we estimate an annual cost of US$3.5 or 7 million over 2 years, to achieve 80% population coverage. This is considerably lower than the funding that was made available for HIV prevention in Pakistan in the last several fiscal years, suggesting that it is feasible to fund programmes at sufficient coverage to stem HIV transmission. According to the 2010 UNGASS report, more than twice this amount was spent on prevention efforts targeting specific populations.[12] This cost may be reduced by eliminating the 13.3% that was spent on women, truckers and jail inmates who are of low HIV prevalence and risk, and rather strategically allocate costs according to local key population sizes and their needs (eg, client volume, frequency of injection).

Considering the behavioural risk of HIV acquisition among FSWs, continued low service coverage leaves that segment of the population highly vulnerable. If the HIV prevalence begins to increase among FSWs, the wider impact will be large due to the very large bridge population formed by the clients of FSWs. To maximise efficient use of limited resources, HIV prevention programmes should be implemented in the geographic locations with large key population sizes, and designed specifically for the local key population characteristics. As the priority cities we identified are in multiple provinces, a national coordinating body would be useful to ensure a coordinated response with strategic allocation of funds to the provinces and provide technical support and capacity-building opportunities to the provinces. Provincial strategic plans should focus prevention resources on saturating programme coverage among IDUs and sex workers according to the local context, characteristics and needs of the local key populations. Engaging NGOs as implementation partners contributes to the success of a programme because many have already established rapport with key population members. Capacity building within these organisations provides staff with the skills to implement, manage and monitor local programmes.

Our analysis sought to demonstrate an approach to maximising the population coverage of HIV prevention programmes for a given budget. Our cost estimates might well be underestimates for a full package of programmes and services, and are intended to demonstrate an approach to determine how to allocate HIV prevention funds to achieve high population coverage. For example, the programmes from which these costs are derived provide 240 condoms per FSW annually, which may not be sufficient if her client volume is higher than 240 per year. Further, costs for structural interventions have not been included. The estimated costs to deliver these programmes using cost estimates from India are indeed higher. Cost estimates per key population member vary according to the purchasing power of national

Table 2 Estimated annual costs of large-scale HIV prevention programme implementation for injection drug users, male/*hijra* sex workers and female sex workers

Population	City	Est. pop. size	% of total	Cum. % of total	Total annual cost per city using Pakistan costs			Cumulative annual cost using Pakistan costs			Cumulative annual cost using India costs	
					2011 PKR	2011 US$	2011 PPP US$	2011 PKR	2011 US$	2011 PPP US$	2011 US$	2011 PPP US$
IDU	Karachi	16 544	35.7	35.7	51 382 676	600 195	1 382 370	51 382 676	600 195	1 382 370	1 100 872	2 501 728
	Faisalabad	7907	17.1	52.8	24 557 714	286 856	660 686	75 940 390	887 050	2 043 056	1 627 021	3 697 398
	Hyderabad	3857	8.3	61.1	11 979 145	139 927	322 280	87 919 535	1 026 977	2 365 336	1 883 673	4 280 641
	Lahore	3596	7.8	68.9	11 168 526	130 458	300 472	99 088 061	1 157 436	2 665 807	2 122 959	4 824 416
	Sukkur	1979	4.3	73.2	6 146 417	71 796	165 360	105 234 478	1 229 231	2 831 167	2 254 646	5 123 674
	Nawabshah	1865	4	77.2	5 792 353	67 660	155 834	111 026 831	1 296 891	2 987 001	2 378 747	5 405 693
	Peshawar	1850	4	81.2	5 745 766	67 116	154 581	116 772 597	1 364 007	3 141 582	2 501 849	5 685 443
	Sargodha	1621	3.5	84.7	5 034 533	58 808	135 446	121 807 130	1 422 814	3 277 028	2 609 714	5 930 566
	Mirpurkhas	1229	2.7	87.4	3 817 052	44 587	102 692	125 624 182	1 467 401	3 379 720	2 691 494	6 116 411
	Larkana	1096	2.4	89.8	3 403 978	39 761	91 579	129 028 160	1 507 162	3 471 298	2 764 425	6 282 144
	Multan	870	1.9	91.7	2 702 063	31 562	72 695	131 730 223	1 538 725	3 543 993	2 822 316	6 413 703
	Quetta	626	1.4	93.1	1 944 243	22 710	52 307	133 674 466	1 561 435	3 596 300	2 863 972	6 508 364
	DG Khan	596	1.3	94.4	1 851 068	21 622	49 800	135 525 534	1 583 057	3 646 100	2 903 631	6 598 490
	Pakpattan	487	1.1	95.5	1 512 534	17 668	40 692	137 038068	1 600 725	3 686 792	2 936 037	6 672 132
	Haripur	493	1.1	96.6	1 531 169	17 885	41 194	138 569 237	1 618 610	3 727 986	2 968 842	6 746 682
	Dadu	470	1	97.6	1 459 735	17 051	39 272	140 028 972	1 635 661	3 767 258	3 000 117	6 817 754
	Gujrat	431	0.9	98.5	1 338 608	15 636	36 013	141 367 580	1 651 298	3 803 271	3 028 796	6 882 928
	Rahim Yar Khan	426	0.9	99.4	1 323 079	15 455	35 595	142 690 660	1 666 752	3 838 866	3 057 143	6 947 346
	Turbat	408	0.9	100.3	1 267 174	14 802	34 091	143 957 834	1 681 554	3 872 958	3 084 292	7 009 043
MSW/HSW	Karachi	15 811	37.3	37.3	24 766 560	289 295	666 305	24 766 560	289 295	666 305	671 165	1 525 221
	Lahore	5004	11.8	49.1	7 838 332	91 559	210 878	32 604 892	380 854	877 183	883 581	2 007 935
	Faisalabad	3329	7.8	56.9	5 214 590	60 911	140 290	37 819 482	441 765	1 017 473	1 024 895	2 329 070
	Multan	2725	6.4	63.3	4 268 476	49 860	114 837	42 087 958	491 624	1 132 310	1 140 569	2 591 939
	Hyderabad	2566	6	69.4	4 019 416	46 950	108 136	46 107 374	538 575	1 240 446	1 249 494	2 839 471
	Quetta	2399	5.7	75	3 757 825	43 895	101 098	49 865 199	582 469	1 341 544	1 351 330	3 070 892
	Sukkur	2338	5.5	80.5	3 662 274	42 779	98 528	53 527 474	625 248	1 440 072	1 450 576	3 296 429
	Larkana	1698	4	84.5	2 659 770	31 068	71 557	56 187 243	656 316	1 511 629	1 522 655	3 460 228
	Peshawar	1564	3.7	88.2	2 449 870	28 617	65 910	58 637 114	684 933	1 577 539	1 589 046	3 611 100
	Sargodha	1338	3.2	91.4	2 095 861	24 481	56 386	60 732 975	709 414	1 633 925	1 645 843	3 740 172
	Haripur	1187	2.8	94.2	1 859 333	21 719	50 022	62 592 307	731 133	1 683 947	1 696 230	3 854 677
	Rawalpindi	980	2.3	96.5	1 535 085	17 931	41 299	64 127 392	749 064	1 725 246	1 737 830	3 949 213
	Nawabshah	807	1.9	98.4	1 264 095	14 766	34 008	65 391 488	763 830	1 759 254	1 772 087	4 027 061
	Mirpurkhas	690	1.6	100	1 080 825	12 625	29 078	66 472 313	776 455	1 788 332	1 801 377	4 093 622
FSW	Karachi	25 399	28.5	28.5	45 958 916	536 841	1 236 452	45 958 916	536 841	1 236 452	1 049 029	2 383 915
	Lahore	23 766	26.7	55.2	43 004 039	502 325	1 156 956	88 962 955	1 039 165	2 393 407	2 030 612	4 614 558
	Multan	5308	6	61.2	9 604 706	112 191	258 399	98 567 661	1 151 357	2 651 807	2 249 843	5 112 760
	Faisalabad	4846	5.4	66.6	8 768 727	102 426	235 909	107 336 388	1 253 783	2 887 716	2 449 993	5 567 599
	Hyderabad	4566	5.1	71.7	8 262 074	96 508	222 278	115 598 462	1 350 292	3 109 994	2 638 577	5 996 157
	Sargodha	3898	4.4	76.1	7 053 343	82 389	189 759	122 651 805	1 432 681	3 299 753	2 799 573	6 362 018
	Quetta	3710	4.2	80.3	6 713 161	78 416	180 607	129 364 966	1 511 096	3 480 360	2 952 803	6 710 233
	Rawalpindi	3635	4.1	84.4	6 577 450	76 830	176 956	135 942 416	1 587 927	3 657 315	3 102 936	7 051 409
	Peshawar	3317	3.7	88.1	6 002 036	70 109	161 475	141 944 453	1 658 036	3 818 791	3 239 934	7 362 738
	Haripur	2994	3.4	91.5	5 417 575	63 282	145 751	147 362 028	1 721 318	3 964 542	3 363 592	7 643 751
	Sukkur	2317	2.6	94.1	4 192 559	48 973	112 794	151 554 587	1 770 291	4 077 336	3 459 289	7 861 221
	Nawabshah	2011	2.3	96.4	3 638 859	42 505	97 898	155 193 446	1 812 796	4 175 234	3 542 347	8 049 971
	DG Khan	1413	1.6	98	2 556 792	29 866	68 786	157 750 238	1 842 661	4 244 020	3 600 707	8 182 593
	Larkana	1114	1.2	99.2	2 015 758	23 546	54 231	159 765 995	1 866 207	4 298 251	3 646 718	8 287 152
	Mirpurkhas	884	1	100.2	1 599 578	18 684	43 034	161 365 573	1 884 892	4 341 285	3 683 229	8 370 123
Grand total for 80% coverage									3 500 351	8 062 013	6 905 229	15 692 106

FSW, female sex workers; HSW, *hijra* sex workers; IDUs, injection drug users; PKR, Pakistani rupees; MSW, male sex workers.

currencies and, therefore, it is important to adjust for purchasing power parity in order to make comparisons across countries. Local costs will also vary according to the particular components and configuration of HIV prevention programmes required for the local context. Overall costs will vary according to the particular size of key populations in the local context.

The government must change the way it prioritises HIV/AIDS, first by approaching HIV as an urgent public health issue and, second, by addressing the underlying socioeconomic determinants of the epidemic as well as stigma, misconceptions and the influence of religious and societal pressures which shape the opportunities, behaviours and vulnerabilities faced by key populations at greater risk of HIV. Fostering a sense of accountability for HIV incidence may reduce the barriers to programme implementation and re-energise decision makers. There are many challenges to the uptake and delivery of comprehensive HIV prevention programmes for IDUs and sex workers in Pakistan, which affects the ability to achieve high population coverage.[29 30] However, strategies also exist that may be used to reduce the barriers to accessing such programmes, such as the implementation of carefully planned outreach services delivered by trained community members, and designing fixed service delivery sites to ensure the accessibility, safety, confidentiality and privacy of patrons. Involving community members in programme planning and implementation increases the likelihood that programmes will be acceptable and accessible to members of these highly marginalised populations, and sensitisation of local authorities to improve the ability of such services to exist without disruption. Given the presence of epidemiological, behavioural and structural differences in different cities across Pakistan, data specific to local contexts should also be used when determining the best ways to deliver HIV prevention programmes.[4]

The cost estimates reported in this paper were derived from key population mapping conducted in major cities across Pakistan and are, therefore, limited by the mapping methodology. The system we used for prioritising cities for HIV prevention interventions targeting key populations was intended as a simplistic demonstration, and only included population-size data. In order to achieve 80% population coverage across the major cities in Pakistan, 100% population coverage would have to be achieved in the prioritised cities, and this is likely not feasible. It did not incorporate data about the prevalence of HIV and risk behaviours among key populations in different cities. We did not incorporate data about the reported frequency of sex, condom use and the sharing of drug injection equipment or information about local social, cultural and political factors which may affect health, behaviours, stigma, social and economic opportunities and access to services. These factors impact the probability of HIV transmission and should be considered in a more comprehensive prioritisation scheme to determine how to allocate HIV prevention resources most efficiently. Also, projections of future HIV prevalence and incidence may inform prioritisation.

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Key messages

▶ Given competing interests, limited funding, socially conservative context and increasing HIV prevalence, it is important to maximise the impact of HIV prevention programmes.
▶ Cities with relatively large key population sizes may be prioritised for the implementations of targeted HIV prevention programmes.
▶ To achieve 80% population coverage, HIV prevention programmes could be implemented in 10 major cities across Pakistan for a total annual operating cost of approximately US$3.5 million which is much less than current annual expenditures.

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