



## **HIV and other STIs among men, transgenders and women selling sex in two cities in Pakistan: prevalence, profiles and policy recommendations**

Sarah J Hawkes, Martine Collumbien, Lucy Platt, Najma Lalji, Narjis Rizvi, Aura Andreassen, Jamie Chow, Rana Muzaffar, Haseeb Ur-Rehman, Noaman Siddiqui, et al.

### **► To cite this version:**

Sarah J Hawkes, Martine Collumbien, Lucy Platt, Najma Lalji, Narjis Rizvi, et al.. HIV and other STIs among men, transgenders and women selling sex in two cities in Pakistan: prevalence, profiles and policy recommendations. Sexually Transmitted Infections, 2009, 85 (Suppl\_2), pp.ii8. 10.1136/sti.2008.033910 . hal-00552799

**HAL Id: hal-00552799**

**<https://hal.science/hal-00552799>**

Submitted on 6 Jan 2011

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# **HIV and other STIs among men, transgenders and women selling sex in two cities in Pakistan: a cross-sectional prevalence survey**

## **ABSTRACT**

### ***Objectives***

The extent and possibilities of HIV epidemic spread are not fully understood in Pakistan. We conducted a survey among people (men, women, transgender populations) selling sex in Rawalpindi (Punjab) and Abbottabad (North West Frontier Province) in order to inform evidence-based programme planning.

### ***Methods***

A cross-sectional survey with participants recruited through respondent driven sampling. Male and transgender sex workers were analysed in three gender groups; women were analysed as one group. Behavioural surveys were conducted, and clinical specimens collected. Laboratory tests looked for evidence of acute infection (gonorrhoea, Chlamydia, syphilis, *Trichomonas*), and infection over the lifetime (HIV, HSV2, syphilis). Predictors of infection were explored using univariable and multivariable logistic regression.

### ***Results***

Prevalence of HIV was low among 917 male and transgender sex workers and absent among 533 female sex workers in the study. High levels of current STIs were found, predominantly among transgender sex workers. Risk behaviours were common, and knowledge of HIV was extremely low. Multivariable analysis found a large number of factors associated with higher levels of infection, including experience of forced first sex. Protection against risk was low, but those sex workers who reported using condoms at last sex had lower rates of infection.

### ***Conclusions***

The HIV epidemic is currently in its early stages among people who sell sex, but there may be potential for a much greater spread given the levels of other STIs found and the concomitant low levels of both protective knowledge and risk reducing behaviours. Action is needed now to avert an epidemic. Framing interventions by upholding the recognition and protection of human rights is vital.

**Key words:**

Pakistan, sex work, HIV, STIs

**Authors:**

Sarah Hawkes, MBBS PhD, London School of Hygiene and Tropical Medicine

Martine Collumbien, MSc, MSc, London School of Hygiene and Tropical Medicine

Lucy Platt, PhD, London School of Hygiene and Tropical Medicine

Najma Lalji, MPH, MBBS, London School of Hygiene and Tropical Medicine

Narjis Rizvi, MBBS, Consultant to London School of Hygiene and Tropical Medicine

Aura Andreasen, PhD, London School of Hygiene & Tropical Medicine

Jaime Chow, MSc, London School of Hygiene & Tropical Medicine

Rana Muzaffar, Sindh Institute for Urology and Transplantation, Karachi

Haseeb ur-Rehman, Organisation for Social Development, Rawalpindi

Noaman Siddiqui, MBBS, DCPS Ayub Medical College, Abbottabad

Salman Hasan, Nai Zindagi, Rawalpindi

Asma Bokhari, formerly head, National AIDS Control Programme, Pakistan

**Contributions:**

Sarah Hawkes : Principal Investigator, contributed to the design of the survey and survey instruments, co-ordinated survey implementation, interpreted data, lead author on the paper

Martine Collumbien: contributed to the design of the survey instrument, analysed and interpreted the data for MTSW and contributed to several drafts

Najma Lalji: contributed to the design of the survey instrument, responsible for project implementation in Pakistan, contributed to paper writing

Lucy Platt: cleaned and coded all the datasets, led the analysis for FSWs, wrote the methods and contributed to the writing of the paper.

Narjis Rizvi: contributed to the design of the survey instrument, assisted with project implementation in Pakistan, contributed to paper writing

Aura Andreasen contributed to the development of the laboratory methods and the writing of the paper.

Haseeb ur-Rahman: responsible for project implementation in Rawalpindi

Noaman Siddiqui: responsible for project implementation in Abbottabad, contributed to paper writing

Jaime Chow: responsible for data analysis and review of manuscript

Rana Muzaffar: responsible for laboratory inputs.

Salman Hasan, contributed to survey design and implementation of the project in Rawalpindi and Abbottabad

Asma Bokhari: contributed to the design of the survey, facilitated survey implementation in Pakistan, contributed to several drafts of the paper.

## Introduction

Pakistan, is currently classified as having a “concentrated HIV epidemic”<sup>1</sup> - a situation which warrants urgent and effective actions to protect vulnerable populations. Defining and measuring the extent of risk and vulnerability in key (“core”) populations are vital steps in designing (and delivering) effective interventions<sup>2</sup>. There is little published evidence available within Pakistan to describe the full extent of epidemic spread of HIV and other sexually transmitted infections (STIs) among key or other population groups<sup>3</sup>.

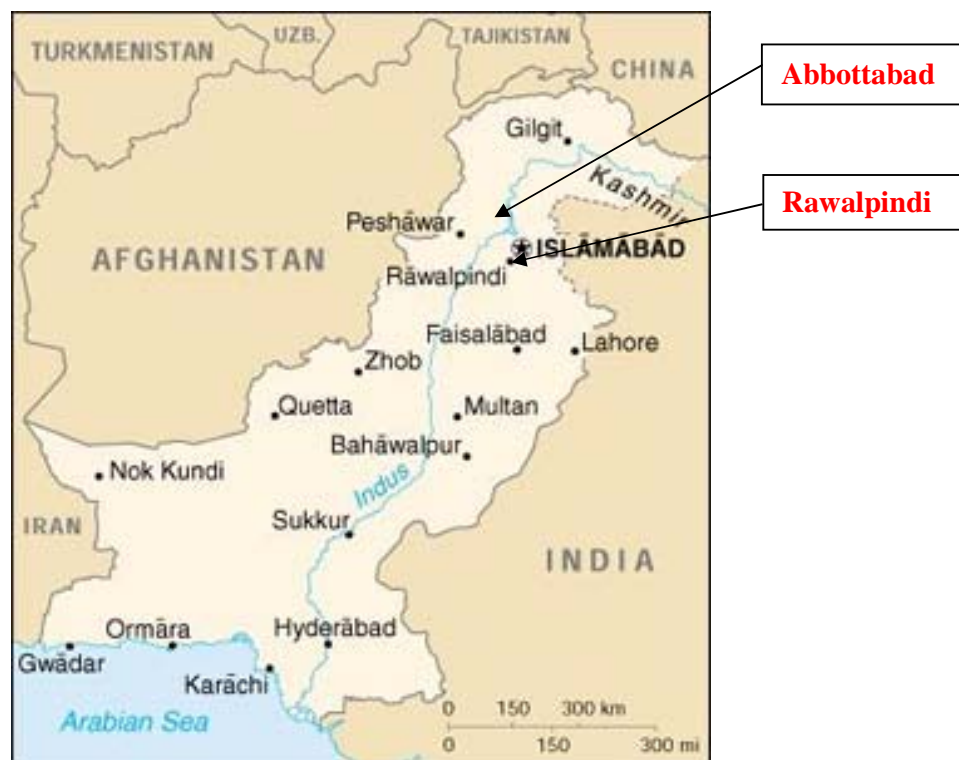
The study we report on was commissioned by the National AIDS Control Programme (NACP) for their development of evidence informed programme planning and priority setting. A rising incidence of HIV among injecting drug users (IDUs) has previously been noted in Pakistan<sup>4</sup>, but there is only limited evidence of an HIV epidemic among others traditionally considered to be at risk (e.g. people who sell sex). A 2006 survey in Karachi found 23% of 400 IDUs were HIV positive, compared to one of 160 IDUs tested in 2003 in the same city<sup>4</sup>. Prevalence of HIV among men selling sex in the same survey was 4%, while none of the female sex workers (FSW) were infected. Other surveys in Pakistan have found a wide HIV prevalence range among IDUs – ranging from 1% in Gujranwala to 30% in Karachi and 51% in the city of Sargodha<sup>5 6 7</sup>.

Our paper focuses on those populations who are at risk of HIV and other STIs through selling sex. We undertook a cross sectional survey in two cities (one large, one small) which were selected in collaboration with the National AIDS Control Programme. The bio-behavioural survey built upon the findings of qualitative research<sup>8</sup>, and provided direct evidence for mathematical modelling<sup>9</sup>, investigating the situation of human rights<sup>10</sup>, and policy analysis of the recommendations<sup>11</sup> – all of which are described elsewhere in this volume. The survey was undertaken to describe the extent of STI and HIV epidemics in the two cities, and associated behaviours including risk taking and protection from risk; it contributes to the evidence base required for programme planning and resource allocation at the national level.

## Methods

Surveys were conducted between August and September 2007 in two cities – Rawalpindi (population 1.8 million) in Punjab and situated adjacent to the administrative capital of Pakistan (Islamabad), and Abbottabad (population 140,000), in North West Frontier Province – see Figure 1. Eligibility criteria were: men, women and transgender populations who had sold sex (in exchange for money or other resources) within the last 30 days. Exclusion criteria included: age less than 18 years; incapable of or unwilling to give informed consent; currently pregnant.

**Figure 1 – Map of Pakistan**



In-depth qualitative research preceded the surveys and directly influenced their focus. For example, it was shown that female sex workers were largely ‘home-based’, a category of sex work of growing importance with the advent of mobile phones for communication with clients and ‘gatekeepers’. Qualitative findings directed us to recruit male and transgender sex workers (MTSW) in three separate groups: *khusra* (transgender, biological males who dress mostly as women, often known as *hijra*, a small number may undergo gender reassignment through use of hormones or surgery), *khotki* (biological males who dress publicly as men but have a “female soul” and

feminised traits) and *bantha* (biological males with a male gender identity). These groups vary in terms of organisational and support networks<sup>8</sup>. All three groups of MTSW were interviewed using the same survey instrument.

Respondents were recruited using Respondent Driven Sampling (RDS) and were interviewed at fixed sites located in a rented house (Rawalpindi) and a community education centre (Abbottabad) using hand held Personal Digital Assistants (PDA, Hewlett Packard)<sup>12 13 14</sup>. Survey staff in both cities included people experienced in working with vulnerable populations in Pakistan. Initial recruits (who were diverse in terms of key characteristics of the four population groups) served as ‘seeds’ for an expanding chain of referrals, with respondents from each wave referring respondents from subsequent waves. Monetary incentives were given to participants and for recruiting others.

Two informed consents were obtained from each participant –for the interview, and for clinical examination and collection of biological samples.

Every woman had a pregnancy test before recruitment. Women found to be pregnant were immediately referred to the local voluntary counselling and testing centre and advised to seek testing for both HIV and syphilis; they did not take further part in the survey.

Clinical samples were collected by trained doctors from all participants: 20ml urine; 5ml venous blood; finger prick blood for point of care syphilis testing. Rectal swabs were collected from male and transgender sex workers; vaginal and cervical swabs were collected from female sex workers. Point of care syphilis testing (Determine, Abbott Diagnostics) was carried out at the time of recruitment, and those who were positive were offered immediate treatment with benzathine penicillin. All participants were offered presumptive treatment for gonorrhoea and Chlamydia. Basic medical care for minor ailments was provided free to all participants. Anyone who required urgent and/or specialized medical care was immediately referred to a local public sector tertiary level hospital.

Clinical specimens were transported (using cold chain methods) on a daily basis to the laboratory of the Sindh Institute for Urology and Transplantation, Karachi. Cervical samples from women, and urine and rectal samples from men and transgenders were tested for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* with Roche Amplicor PCR (Roche Diagnostics GmbH). Samples showing inhibition were heat inactivated at 95°C for 10 minutes and retested. Vaginal samples were tested for *Trichomonas vaginalis* (TV) using in-house PCR (provided by the London School of Hygiene and Tropical Medicine)<sup>15</sup>. Sera were screened for antibodies to: HIV-1&2 by microparticle enzyme immunoassay (AxSYM, Abbott Diagnostics) and positive results confirmed by Vironostika HIV Uni-Form II *plus O*, EIA, (BIOMERIEUX France); HSV-2 (HerpeSelect 2 ELISA IgG, FOCUS Diagnostics USA); quantitative RPR (SYPHILIS (SYP-RPR) Randox) and TPHA (SYPHILIS (SYP-TPHA) Randox). All RPR positive samples were titrated. The laboratory participated in external quality control organised by the Health Protection Agency, UK, for the duration of the study.

HIV testing was anonymised, but serological specimens were linked to survey data by a bar-code. While participants were not able to find out their individual HIV results via this process, those who wished to know their HIV status were referred to local centres able to offer testing and follow-on care. All participants were asked to return after three weeks to collect their STI laboratory results and receive treatment if they had not been already treated (presumptively or otherwise) for an aetiologically diagnosed and curable infection.

#### *Statistical methods*

Chlamydia, gonorrhoea, TV and current syphilis (RPR titre  $\geq 1:8$  /TPHA+) were analysed together to identify variables associated with current infection in female sex workers. For male sex workers we did not include *Trichomonas* in the analysis of current infections. Evidence of infections over the lifetime were explored separately for HIV/HSV2 combined, and the presence of latent syphilis (RPR-/TPHA+, or RPR  $\leq 1:4$ /TPHA+). All variables were explored using univariable and multivariable logistic regression. Statistical significance was assessed using the Wald statistic. Stata 10 (Stata Corp, College Station, Texas) was used for all analyses.



Multivariable analysis followed a conceptual framework approach<sup>16</sup>. This involved classifying variables into six groups (socio demographic indicators, recent sexual risk, past sexual sexual behaviour, drug related, knowledge and contact with services and context of sexwork), with the analysis conducted in three stages: (i) separate univariate models explored each of the variables alone with the outcome; (ii) variables associated with the outcome in univariate analysis to the significance level of  $p \leq 0.2$  were included in separate multivariable models for each group; and (iii) variables reaching a significance level of  $p \leq 0.2$  in each of the multivariable models were then included in one overall multivariable model. In addition, variables excluded at the first stage were added at the second and third stage models to assess their association with the outcome variable in the presence of other variables.

The study was undertaken with ethical approval from both Nai Zindagi Institutional Review Board (in Pakistan) and the London School of Hygiene and Tropical Medicine (in the United Kingdom).

## Results

### *Participation*

We recruited 540 female sex workers (431 in Rawalpindi, 109 in Abbottabad), and 915 MTSW (812 and 103 respectively in each city). Eighty percent of MTSW in Abbottabad were *banthas*, compared with 30% in Rawalpindi – see Table 1 for gender distribution between cities. Few people (N=27) declined to participate. Seven women were ineligible to participate (five found to be pregnant on initial testing, two for other reasons). Incomplete collection of the RDS data meant that we were unable to adjust the sample proportions for network size or recruitment biases.

### *Characteristics*

The median age of FSWs was 30 and the majority (91%) were married with children (98%). The MTSW were younger (mean ages ranged from 21 for *banthas* to 27 for *khusra*); and a small number (10-19%) were married (to women). While most sex workers lived with their families, over 80% of *khusra* reported living in *daira* (communal household with other *khusra*). High levels of violence in the last year were reported by all groups: among FSWs, 66% reported violence from husbands and 38% from clients; for MTSW, police and clients were the most common perpetrators of violence. Sexual health indicators showed that a majority of women (63%) reported recent symptoms of possible STIs, and although 32% of FSW sought care from an allopathic provider in the last year only a small number had ever had an HIV test. Smaller numbers of transgender (29%) and male (20%) sex workers reported recent symptoms; and, again, although between a quarter and almost two fifths had sought care from allopathic providers, very small numbers had ever had an HIV test. See Table 1.

**Table 1 – Characteristics of Female, Male and Transgender Sex Workers in Rawalpindi and Abbottabad.**

<b>Characteristics of Participants</b>	Female sex workers	Male sex workers		
		<i>Bantha</i> <sup>1</sup>	<i>Khotki</i> <sup>2</sup>	<i>Khusra</i> <sup>3</sup>
Number of Participants	540	278	368	269
Rawalpindi	431	195	364	253
Abbottabad	109	83	4	16
<b>Socio-demographics</b>				
Age groups (Years)				
18/19	20 (4%)	128 (46%)	121 (33%)	37 (14%)
20-24	75 (14%)	100 (36%)	137 (37%)	68 (25%)
25-29	124 (23%)	24 (9%)	60 (16%)	67 (25%)
30-34	127 (24%)	18 (7%)	30 (8%)	43 (16%)
35 or older	191 (36%)	8 (3%)	20 (5%)	54 (20%)
Mean (Median) age	30.6 (30)	21.6 (20)	23.1 (21.5)	27.4 (26)
Currently married	490 (91%)	39 (14%)	69 (19%)	28 (10%)
No formal education	345 (64%)	81 (29%)	150 (41%)	131 (49%)
Has children	462 (98%)	31 (11%)	57 (16%)	25 (9%)
Has employment outside sex trade	301 (59%)	217 (83%)	221 (61%)	50 (19%)
Lives with family	478 (91%)	254 (92%)	254 (69%)	27 (10%)
Lives in <i>daira</i>	Not Applicable	1 (0.4%)	47 (12.8%)	219 (81.4%)
Lives elsewhere	47 (9%)	21 (7.6%)	67 (18.2%)	23 (8.6%)
<b>Environmental Characteristics</b>				
Ever been in jail	22 (4%)			
Violence from neighbour in past year	123 (24%)	12 (4%)	44 (12%)	25 (9%)
Sexually violated by neighbour in past year	72 (14%)	20 (7%)	31 (8%)	51 (19%)
Violence from client in past year	196 (38%)	61 (22%)	163 (44%)	91 (34%)
Sexually violated by client in past year	108 (21%)	30 (11%)	103 (28%)	73 (27%)
Violence from police in past year	23 (5%)	43 (16%)	67 (18%)	86 (32%)
Sexually violated by police in past year	42 (8%)	43 (16%)	44 (12%)	73 (27%)
Violence from	317 (66%)	Not	Not	Not

husband in past year		applicable	applicable	applicable
Sexually violated by husband in past year	157 (34%)	Not applicable	Not applicable	Not applicable
Provided free sex to police in past year	187 (35%)	65 (24%)	127 (35%)	106 (39%)
<b>Sexual Health</b>				
Uses modern method of contraception	334 (64%)	Not asked	Not asked	Not asked
Lifetime history of abortion	288 (60%)	Not applicable	Not applicable	Not applicable
Reported any symptom of possible STI in past month	317 (63%)	58(21%)	68 (19%)	79 (29%)
Genital discharge past year	349 (67%)	15 (5%)	31 (8%)	37 (14%)
Burning pain on urination past year	240 (46%)	85 (31%)	109 (30%)	90 (33%)
Genital ulcers past year	100 (19%)	6 (2%)	43 (12%)	27 (10%)
Anal problem past year	33 (6%)	20 (7%)	60 (16%)	55 (20%)
Sought care from allopathic provider for STI-like symptoms past year	173 (32%)	70 (25%)	102 (28%)	103 (38%)
Ever had an HIV test	12 (6%)	2 (1%)	18 (5%)	39 (14%)
Ever had an HCV test	33 (6%)	7 (3%)	9 (3%)	11 (4%)
<b>Knowledge of HIV</b>				
Ever heard of HIV	182 (35%)	96 (35%)	133 (36%)	108 (40%)
Aware of risk of injecting	Variable corrupted	94 (34%)	125 (34%)	99 (36%)
Aware of risk of unprotected sex	Variable corrupted	94 (34%)	132 (36%)	103 (38%)

<sup>1</sup> *bantha* = biological males with a male gender identity

<sup>2</sup> *khotki* = biological males who dress publicly as men but have feminised traits

<sup>3</sup> *khusra* = transgender, biological males who dress mostly as women

Table 2 reports on risk behaviours and risk reduction measures. FSWs reported first sexual experience at median age 16 years, while for MTSW sexual debut was younger. First sex was forced among 5% of FSW, rising to 18% among the *khusra*. *Bantha* had been selling sex for a mean of 6 years, while women and *khusra* had been selling sex for a mean of 14 and 12.5 years respectively. Numbers of clients in the past week ranged from 3 (*bantha*) to 7 (*khusra*), with the proportion of new clients in a week higher among the MTSW compared to FSWs. Reports of condom use varied according to time frame (“last sex with a client” or “always used in last month with client”) and the type of sex being sold (vaginal, oral, anal). The MTSW reported consistently low rates of condom use.

Only small numbers of respondents had ever injected drugs themselves, but injecting drug users were relatively common as clients, partners or husbands.

**Table 2 – Risk behaviours and risk reduction measures reported by sex workers in Rawalpindi and Abbottabad**

	<b>FSWs</b>	<b>Bantha</b>	<b>Khotki</b>	<b>Khusra</b>
<b>Number of Participants</b>	540	278	368	269
Rawalpindi	431	195	364	253
Abbottabad	109	83	4	16
<b>Sexual Debut</b>				
Mean age at first sex (SD)	16.6 (3.6)	14.1 (2.9)	13.4 (2.2)	13.3 (2.4)
<12	10 (1.9%)	41 (15%)	69 (19%)	51 (19%)
12/15	198 (37.6%)	165 (60%)	239 (65%)	181 (67%)
16/17	139 (26.4%)	49 (18%)	52 (14%)	31 (11%)
18+	180 (34.2%)	21 (8%)	8 (2%)	8 (3%)
First sex was forced	27 (5%)	36 (13%)	36 (10%)	50 (18%)
Mean age difference with first sex partner (SD)	6.9 (5)	9.2 (8.5)	9.3 (8)	11.9 (10)
<b>Sexual Risk</b>				
Mean number of years in sex work (SD)	13.9 (6.7)	6.7 (4.4)	8.5 (5.3)	12.5 (6.3)
Mean number of clients in past week (SD)	5.5 (3.6)	3.2 (2.3)	4.8 (2.9)	7.0 (6.4)
Mean number of new clients in past week (SD)	1.7 (1.4) 0 = 46 (8%) 1 = 251 (47%) 2+ = 241 (45%)	1.8 (2) 0 = 56 (20%) 1 = 78 (28%) 2+ = 142 (51%)	2.0 (3) 0 = 46 (13%) 1 = 40 (11%) 2+ = 282 (77%)	4.0 (3) 0 = 34 (13%) 1 = 36 (13%) 2+ = 201 (74%)
Mean number of non paying partners in past year (excl gyria) (SD)	Not asked	1.6 (3.5)	0.8 (1.6)	0.6 (1.2)
<b>Risk Reduction</b>				
Used condom last vaginal sex with client	205/536 (38%)	Not applicable	Not applicable	Not applicable
In last month always used condom during vaginal sex with client	63/526 (12%)	Not applicable	Not applicable	Not applicable
Used condom last anal sex with client	99/162 (61%)	65/278 (23%)	114/368 (31%)	68/272 (25%)
In last month always used condom during anal sex with client	N/A	29/278 (10%)	28/368 (8%)	11/272 (4%)
Used condom last oral sex with client	59/109 (54%)	4/64 (6%)	25/168 (15%)	16/103 (16%)
Used condom last sex with husband/gyria	240/517 (46%)	0/6	34/125 (27%)	7/108 (7%)
In last month always used condom during sex with husband/gyria	78/515 (15%)	0/5	10/124 (8%)	7/108 (7%)
Condom with non paying partner	45/92 (49%)	24/128 (19%)	21/139 (15%)	9/70 (13%)
<b>Drug Use</b>				
Injected drugs in past	18/534 (3%)	9/265 (3%)	3/364 (1%)	0 (0%)

year				
Had IDU sex partner(s) (past year)	194/540 (36%)	50/259 (19%)	85 /363 (23%)	67/265 (25%)
Had husband/gyria who is IDU (past year)	140/504 (28%) 140/540 (26%)	0/273 (0%)	2/366 (0.5%)	5/261 (2%)
Uses other types of (non-injectable) drugs	Not asked	60/265 (23%)	142/364 (39%)	119/267 (45%)
Drank alcohol in past month	190/525 (36%)	115/265 (43%)	171/364 (47%)	147/267 (55%)

### *Prevalence of infections*

Infections were found more frequently among MTSW compared to FSW. No cases of HIV were found in Abbottabad, and a small number of MTSW (0.5% of *bantha* and 2.4% of *khusra*) were found to be HIV positive in Rawalpindi. Serological evidence of herpes infection was found in slightly more than half of *khusra* (54%), 14% of *khotki*, and less than 10% of all other groups. Evidence of past syphilis infection was uncommon. Current infections were predominantly found among the *khusra* community, with almost half in Rawalpindi with active syphilis, and 22.5% (57/253) in the same city with rectal gonorrhoea or Chlamydia – see Table 3.

**Table 3: Prevalence of STIs and HIV among people with high risk behaviours in Rawalpindi and Abbottabad (expressed as %s with confidence intervals)**

	Male sex workers						Female sex workers	
	Rawalpindi			Abbottabad			Rawalpindi	Abbottabad
	<i>Bantha</i>	<i>Khotki</i>	<i>Khusra</i>	<i>Bantha</i>	<i>Khotki</i>	<i>Khusra</i>		
<b>Number tested</b>	195	364	253	83	4	16	426	107
HIV	0.5 (0.005-1.5)	0	2.4 (0.4-4.3)	0	0	0	0	0
HSV	7.4 (3.6-11.1)	14 (10.4-17.6)	54 (47.7-60.2)	2.5 (0.4 – 9.5)	25 (1.3 – 78)	31.3 (12.1 – 58.5)	8.0 (5.4-10.6)	4.7 (6.1-8.7)
Syphilis (all RPR+/TPHA+)	4.7 (1.7-7.7)	9.6 (6.6-12.7)	48.8 (42.6-55.0)	4.9 (0.12-9.8)	0	37.5 (10.9-64.1)	1.2	2.8
RPR ≤ 1:2	1.5	3.6	8.7	2.4	0	18.8	10.5	1.8
RPR = 1:4	2.6	1.9	7.5	0	0	12.5	0	0.9
RPR = 1:8	0.5	1.9	9.9	0	0	6.3	0.2	0
RPR = 1:16	0	1.4	13.4	0	0	0	0	0
RPR ≥ 1:32	0	0.8	9	2.4	0	0	0.5	0
RPR-/TPHA+ (presumed past infection)	4.7	6	21.4	5	0	37.5	0.5	0
Rectal gonorrhoea	12.6 (7.8-17.4)	4.7 (2.5-6.8)	20.2 (15.2-25.2)	11.1 (5.5 – 20.5)	0	6.3 (0.33 – 32.3)	Not tested	Not tested
Rectal Chlamydia	4.7 (1.7-7.7)	3.6 (1.6-5.5)	9.9 (6.2-13.6)	4.9 (1.6 – 12.8)	0	6.3 (0.33 – 32.3)	Not tested	Not tested
Urine gonorrhoea (MTSW) or cervical gonorrhoea (FSW)	0	0	0	0	0	0	2.0 (0.6-3.4)	1.9 (0.007-4.5)
Urine Chlamydia (MTSW) or cervical Chlamydia (FSW)	0	0	0	1.2 (0.06 – 7.5)	0	0	1.7 (0.4-3.1)	0.9 (0.009-0.3)
<i>Trichomonas vaginalis</i>	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	4.3 (2.3-6.3)	5.7 (1.2-10.3)



### *Multivariate analysis*

Tables 4 and 5a-c summarise findings from the multivariate analysis: those variables associated with current infection (higher titre syphilis, gonorrhoea, Chlamydia or Trichomonas), or infection with HSV2 or HIV. Full details are available in the webtables.

Table 4 presents multivariate analysis for FSWs. The odds of having a current infection were higher in FSWs who were not married (OR=4.16; p=0.002), and those who experienced first sex as forced (OR=2.05; p=0.04). Women had higher odds of HSV2 infection if they reported ever drinking alcohol (OR=2.41; p=0.01), but had lower odds if they reported more clients in the last 7 days (OR=0.37; OR=0.25 respectively; p=0.04). With only 2 past syphilis infections, it was not possible to run a risk analysis.

**Table 4: Variables associated with STIs in female sex workers; results of multivariate analysis**

	+/total	OR	(95% CI)	aOR	(95% CI)	P-value^
<b>Current Infection (GC, CT, high titre syphilis, TV)</b>						
Currently married						
Yes	29/490	1.00		1.00		
No	9/39	3.86	(1.74-8.77)	4.16	(1.81-9.54)	0.002
First sex was forced						
No	14/279	1.00		1.00		
Yes	24/259	1.93	(0.98-3.82)	2.05	(1.03-4.11)	0.04
<b>HSV2 Infection</b>						
Number of new clients in the last week						
0	7/46	1.00		1.00		0.04
1	19/251	0.46	(0.18-1.16)	0.37	(0.14-0.97)	
2 or more	14/241	0.34	(0.13-0.91)	0.25	(0.09-0.68)	
Ever drank alcohol						
No	14/274	1.00		1.00		
Yes	26/262	2.05	(1.04-4.01)	2.41	(1.21-4.85)	0.01

^ P-value derived from Likelihood Ratio Test

Tables 5a-c present the results of multivariate analysis for bantha, khotkis and khusra, respectively. Current infections with gonorrhoea, Chlamydia or high titre syphilis, were more likely to be found among bantha sex workers living away from their families (OR=2.51; p=0.07) and khotki sex workers who had spent more than 10 years in sex work (OR=3.35; p=0.05). Khusra sex workers had higher odds of current infections if they had another source of income (OR=1.97; p=0.03), or reported that their first sex was forced (OR=2.96; p=0.003). Older age at first sex with a man was associated with increased odds of current infection (p=0.03), though only a minority of khusra experienced sexual debut after the age of 15 (leading to large confidence intervals). Both khotki and khusra who reported use of condoms at last anal sex had lower odds of current infections (OR=0.38; p=0.02 and OR=0.33; p=0.001, respectively).

Among the bantha, HSV2 and/or HIV were found more frequently in older men (OR=1.24; p<0.001, similarly, older khotkis also had higher odds of HSV2 (no HIV in this group) (OR=1.27; p<0.0001), as did those khotkis who had one or more non-paying partners in the last year (OR=3.50; p=0.02). Older khusra (OR=1.17; p=0.0001) and those khusra who reported that their first sex was forced had higher odds of HSV2/HIV infections (OR=2.21; p=0.03). Several variables were found to be associated with lower odds of HSV2/HIV infection – lower odds were found in khotki who did not live in the same city as their family (OR=0.39; p=0.03) or who had increasing number of clients in the last week (OR = 0.15; p<0.001). Khusra who had ever heard of HIV (OR=0.54; p=0.03) had lower odds of being infected with HSV2/HIV, as did those khusra who reported using condoms at last anal sex with a client (OR=0.48; p=0.04).

Past infection with syphilis (results not shown in the tables) was found more frequently in older age groups: bantha (OR=1.11; p=0.01); khotkis (OR=1.18; p=0.003,); and khusra (OR=1.15; p=0.05); while married khotki also had higher odds of syphilis (OR=2.88; p=0.03).

**Table 5a: Variables associated with current infections and HSV2/HIV in banthas; results of multivariate analysis**

	+/total	OR	(95% CI)	aOR	(95% CI)	P-value^
<b>Current Infection</b>						
<b>Demographic Indicators</b>						
Living arrangement						
Daira	0/1					
Family	39/249	1.00		1.00		0.07
Other	7/21	2.51	(0.96-6.56)	2.51	(0.96-6.56)	
<b>HSV2 / HIV Infection</b>						
<b>Demographic Indicators</b>						
Increasing age		1.24	(1.14-1.35)	1.24	(1.14-1.34)	<0.001

^ P-value derived from Likelihood Ratio Test

**Table 5b: Variables associated with current infections and HSV2/HIV in khotki; results of multivariate analysis**

	+/total	OR	(95% CI)	aOR	(95% CI)	P-value^
<b>Current Infection</b>						
<b>Recent Sexual Behaviour</b>						
Condom use during last anal sex						
No	35/254	1.00		1.00		0.02
Yes	7/114	0.41	(0.18-0.95)	0.38	(0.16-0.91)	
Years engaged in sex work						
<5	7/86	1.00		1.00		0.05
5-9	15/165	1.13	(0.44-2.88)	1.67	(0.63-4.44)	
10+	20/117	2.33	(0.94-5.78)	3.35	(1.29-8.72)	
<b>HSV2 / Infection</b>						
<b>Demographic Indicators</b>						
Increasing age		1.25	(1.18-1.32)	1.27	(1.19-1.36)	<0.0001
Family lives in same city						
Yes	40/250	1.00		1.00		0.03
No	12/118	0.59	(0.30-1.18)	0.39	(0.16-0.96)	
<b>Recent Sexual Behaviour</b>						
Number of new clients in the last week						
0	18/46	1.00		1.00		<0.0001
1-2	21/132	0.29	(0.14-0.63)	0.45	(0.17-1.15)	
3+	13/190	0.11	(0.05-0.26)	0.15	(0.06-0.42)	
Number of non-paying partners in the last year						
0	11/128	1.00		1.00		0.02
1	22/134	2.09	(0.97-4.51)	3.50	(1.24-9.89)	
2 or more	19/106	2.32	(1.05-5.13)	3.42	(1.19-9.85)	

^ P-value derived from Likelihood Ratio Test

**Table 5c: Variables associated with current infections and HSV2/HIV in khusra;  
results of multivariate analysis**

	+/total	OR	(95% CI)	aOR	(95% CI)	P-value <sup>^</sup>
<b>Current Infection</b>						
<b>Demographic Indicators</b>						
City of residence						
Rawalpindi	111/254	1.00		1.00		<0.001
Abbottabad	2/17	0.17	(0.04-0.77)	0.08	(0.01-0.42)	
Other income (Not sex-work related)						
No	83/216	1.00		1.00		0.03
Yes	27/49	1.97	(1.05-3.68)	1.97	(1.05-3.68)	
<b>Recent Sexual Behaviour</b>						
Condom use during last anal sex						
No	98/203	1.00		1.00		<0.001
Yes	15/68	0.30	(0.16-0.57)	0.33	(0.17-0.65)	
<b>Past Sexual Behaviour</b>						
Age at first sex with a man						
<12	14/51	1.00		1.00		0.03
12-15	77/180	1.98	(1.00-3.91)	2.16	(1.00-4.65)	
16-17	17/31	3.21	(1.26-8.19)	3.60	(1.24-10.43)	
18+	5/8	4.40	(0.93-20.92)	10.82	(1.11-105.44)	
First sex with man was forced						
No	84/219	1.00		1.00		0.003
Yes	29/50	2.22	(1.19-4.14)	2.96	(1.44-6.09)	
<b>HSV2 / Infection</b>						
<b>Demographic Indicators</b>						
Increasing Age		1.16	(1.11-1.21)	1.17	(1.11-1.23)	<0.0001
<b>Recent Sexual Behaviour</b>						
Condom use during last anal sex						
No	119/203	1.00		1.00		0.04
Yes	24/68	0.39	(0.22-0.68)	0.48	(0.25-0.93)	
First sex with man was forced						
No	110/219	1.00		1.00		0.03
Yes	32/50	1.76	(0.93-3.33)	2.21	(1.03-4.76)	
<b>Healthcare and Knowledge</b>						
Ever heard of HIV or AIDS						
No	99/163	1.00		1.00		0.03
Yes	44/108	0.44	(0.27-0.73)	0.54	(0.30-0.96)	

<sup>^</sup> P-value derived from Likelihood Ratio Test.

## Discussion

We have completed a large survey of sex workers in Rawalpindi and Abbottabad in Pakistan, with high rates of participation in both cities. Conducting surveys in two sites allows for comparisons between a large and a smaller city. As with all other studies, the interpretation of these results and their generalisability to other, non-comparable cities and settings, should be exercised with caution. Nonetheless, results arising from this work highlight a number of issues which are of direct relevance for STI/HIV control in the two cities where the work was conducted, and in similar settings in Pakistan.

The [low prevalence] HIV results have brought into focus the extremely heterogeneous nature of the epidemic in Pakistan, and are consistent with the wide variation in HIV prevalence reported from national bio-behavioural surveillance<sup>6</sup> and cross-sectional surveys<sup>4</sup>. The particular vulnerability of the *khusra* (transgender) to HIV and other STIs is reflected in their high STI prevalence –almost half (49%), for example, were RPR+/TPHA+ (any titre), and around half (54%) had serological evidence of HSV2 infection. Levels of rectal infection were especially high among *khusra* and *bantha*. It should be noted that problems with specificity have been found using Amplicor on rectal specimens<sup>17</sup>, but this is usually more problematic in low prevalence populations<sup>18</sup>. The high levels of STIs in transgender populations are consistent with findings from other surveys in Asia<sup>19</sup>.

FSWs, in contrast, had low prevalence of STIs (and no HIV) - at levels similar to population-based surveys among women in the general (i.e. not high risk) population elsewhere in Asia<sup>20 21</sup>. Among FSWs, there may be several reasons for the low prevalence of both current and past infections. They have a relatively low number of *new* clients (as compared to MTSW in the same cities) with many of FSW seeming to service a few ‘regular’ clients. However, women reported significant levels of potential exposure, high levels of vulnerability (as evidenced by the high levels of physical and sexual assault to which they are subjected) and scant evidence that they currently possess the knowledge or means to protect themselves against infection.

Although condom use reported by FSW was higher than among MTSW, women reported the lowest levels of condom use with their clients – ie husbands and regular

non-paying partners were more likely to have used a condom at last [vaginal] sex than clients were. This may seem a surprising finding but is possibly explained by the use of condoms with husband and regular partners as contraception – as reported by 49% of women. This finding deserves confirmation and explanation from further research, as does the finding that those women reporting more clients in the past week had a lower rate of HSV2 infection. Addressing and changing risks to the health of these women will require an approach that incorporates, *inter alia*, behaviour change among male partners (and especially clients) within the wider context of structural change – an area which requires further exploration in Pakistan and elsewhere<sup>22</sup>. Other programmes have shown that changes are more successful and sustained when interventions include structural changes<sup>23</sup>

Findings from the survey serve to illustrate the importance of understanding the context and background of sex workers' lives - including social networks. *Khotk*, who lived away from their families were seemingly protected from infection with HSV2. The protective social network for the *khusra* and *khotki* is likely to lie outside the natal home and within the *dairas* or other social networks. In contrast, *Bantha* who live away from their family were more likely to have acute infections.

Violence was a common experience in the lives of sex workers – both current, and over the lifetime. Key perpetrators of violence included partners (husbands, regular non-paying partners), clients, neighbours, and the police. There is increasing evidence of the role that violence (by intimate partners, by clients, by state forces) plays in shaping the risk environment for those who sell sex in many parts of the world<sup>24 25 26</sup>. *Khusra* report high levels of abuse in the recent past (more than a quarter were raped by the police in the last year) – possibly indicative of a lifelong pattern of abuse (1 in 5 had their first sex below the age of 12, almost 9 out of 10 were sexually active by 14; first sex was forced for 1 in 5 of them).

First sex was reported as being forced (in childhood in the vast majority of cases) between 5-18% of respondents. Multivariate analysis highlighted the importance that forced first sex had on long term risk of STIs. It was associated with a higher odds of acute infection in *khusra* and FSWs, and HSV2/HIV in *khusra*. The longer term sexual health implications of childhood sexual abuse have previously been noted in



populations of young women<sup>27</sup> and men who have sex<sup>28</sup> with men in the United States, but this is the first time that such associations have been noted among sex working populations in Pakistan. This finding serves to illustrate not only the long term impact that abuse in childhood may have but also the lifetime nature of risk and vulnerability.

Nonetheless, among *khotki* and *khusra*, there is evidence that risk reduction strategies can be effective at preventing infection. Lower rates of current and past infection were found among *khusra* reporting using condoms at last anal sex with clients, and among those *khusra* who had correct knowledge about HIV risk reduction.

In our survey, risk reduction behaviours among some of the male and transgender sex workers give some cause for optimism – and impetus for action. There are notably successful interventions with sex workers in the south Asian region – programmes have managed not only to address immediate risk environments, but have focused on the context and structural determinants of risk too<sup>29</sup>. In part, the success of these interventions, has relied upon utilising existing social and professional networks to increase knowledge, promote empowerment, and enable those at risk (e.g. women selling sex) to insist on safer sex<sup>30</sup>. While these interventions have proven difficult to replicate in other settings<sup>31</sup>, they may nonetheless provide some guidance for the direction of effective strategies for reducing risk among sex workers in Pakistan.

## **Limitations**

As with any survey, there are limitations to the survey itself and the interpretation of the findings. The data are drawn from a cross sectional survey and behavioural findings are based on self-reports, so any inferences about causality between risk factors and current or past infection are limited. Furthermore, since the sample was recruited from community settings, there is no established sampling frame from which a measure of representativeness can be obtained. During the course of the survey, incomplete collection of the RDS data prevented the sample proportions from being adjusted for network sizes and recruitment biases and thus did not allow us to obtain population estimates of FSW and MTSW characteristics. Comparisons with findings from other surveys in Pakistan, however, show that the people who participated in the

surveys in Rawalpindi and Abbottabad had broadly similar characteristics and reported behaviours to those sex workers taking part in behavioural surveillance, with some exceptions (including numbers of partners and use of condoms)<sup>32</sup>, and STI/HIV prevalence levels are similar to those found in other sex worker surveys in Pakistan<sup>33</sup>. Knowledge of HIV and its transmission were low in our survey compared to findings in many other cities, and this may account for some of the observed differences.

### **Conclusions and Recommendations**

An HIV and further STI epidemic in Pakistan is not inevitable. There are known-to-be effective interventions (behavioural, biomedical, possibly structural) to reduce HIV/STI risks, and improve sexual health<sup>34 35 36 37</sup>. A hierarchy of interventions exists, and the ultimate selection of the most appropriate interventions is often dependent on the prevailing political and social climate for reducing risk<sup>38</sup>. Addressing underlying vulnerabilities and the lack of an enabling environment faced by all people in the study face is of paramount importance for the success and sustainability of any proposed intervention. As a matter of urgency these interventions should include provision of high quality comprehensive sexual health care which is accessible and available to all sex workers. Framing interventions by upholding the recognition and protection of their human rights is vital.

**Key Messages**

- Low levels of knowledge, poor access to interventions and high levels of risk behaviours have been found among all sex workers.
- Transgender sex workers are particularly vulnerable to infection, and this vulnerability starts at a very young age.
- Social networks are strong in the sex working communities, especially among MTSW, and could be leveraged for changing community norms around safer sex.
- Equitable access to effective interventions and commodities (condoms, lubricants, comprehensive sexual health care, etc) is urgently needed – this should be a priority for the national programme.
- Framing interventions by respecting human rights and protecting against stigma and discrimination is vital.

## References

- <sup>1</sup> 1. UNAIDS.  
[http://data.unaids.org/pub/Report/2008/pakistan\\_2008\\_country\\_progress\\_report\\_en.pdf](http://data.unaids.org/pub/Report/2008/pakistan_2008_country_progress_report_en.pdf).  
(Accessed Aug 24<sup>th</sup> 2008)
- <sup>2</sup> Plummer FA, N. N., Moses S, Ndinya-Achola JO, Bwayo J, Ngugi E. (1991). "The importance of core groups in the epidemiology and control of HIV-1 infection." AIDS. 5 Suppl 1: :S169-76.
- <sup>3</sup> Rajabali A, Khan S, Warraich HJ, Khanani M, Ali SH. HIV and homosexuality in Pakistan. *Lancet Infect Dis* 2008; 8: 511–15
- <sup>4</sup> Bokhari A, N. N., Jackson D, Rehan NE, Rahman M, Muzaffar R, Mansoor S, Raza H, Qayum K, Girault P, Pisani E, Thaver I. "HIV risk in Karachi and Lahore, Pakistan: an emerging epidemic in injecting and commercial sex networks." *International Journal of STD & AIDS* (2007); 18 486–492.
- <sup>5</sup> Achakzai M, K. M., Kasi P (2007). "Seroprevalences and co-infections of HIV, hepatitis C virus and hepatitis B virus in injecting drug users in Quetta, Pakistan." *Tropical Doctor* 37: 43-45
- <sup>6</sup> National AIDS Control Programme, M. o. H. (2007). *HIV Second Generation Surveillance in Pakistan*. Islamabad, Ministry of Health.
- <sup>7</sup> Rehman N, E. F., Akhtar S (2007). "HIV transmission among drug users in Larkana, Pakistan." *Tropical Doctor* 37: 58-59.
- <sup>8</sup> Collumbien et al this volume
- <sup>9</sup> Vickerman et al, this volume
- <sup>10</sup> Mayhew et al, this volume
- <sup>11</sup> Buse et al, this volume
- <sup>12</sup> Heckathorn DD. Respondent-Driven Sampling: A new approach to the study of hidden populations. *Social Problems*. 1997;44(2):174-98.
- <sup>13</sup> Heckathorn DD, Semaan S, Broadhead R, S., Hughes J, J. Extensions of Respondent Driven Sampling: A new approach to the study of injection drug users aged 18-25. *AIDS Behav*. 2002;6(1):55-67.
- <sup>14</sup> Magnani R, Sabin K, Saidel T, Heckathorn DD. Review of sampling hard-to-reach and hidden populations for HIV surveillance. *AIDS*. 2005;19(Suppl 2):S67-S72.
- <sup>15</sup> Vander Pol B, Kraft CS, and Williams JA. Use of an adaptation of a commercially available PCR assay Aimed at diagnosis of Chlamydia and Gonorrhea to detect

---

*Trichomonas vaginalis* in urogenital specimens. *Journal of Clinical Microbiology*. 2006. Vol 44(2): 366-373.

<sup>16</sup> Victora, C. G., S. R. Huttly, et al. (1997). "The role of conceptual frameworks in epidemiological analysis: a hierarchical approach." *International Journal of Epidemiology* 26(1): 224-227.

<sup>17</sup> Whiley DM, Tapsall JW, Sloots TP. Review Nucleic Acid Amplification Testing for *Neisseria gonorrhoeae* An Ongoing Challenge. *Journal of Molecular Diagnostics*, 2006;8(1):3-15

<sup>18</sup> Diemert DJ, Libman M, Lebel P. Confirmation by 16S rRNA PCR of the COBAS AMPLICOR CT/NG Test for Diagnosis of *Neisseria gonorrhoeae* Infection in a Low-Prevalence Population. *Journal of Clinical Microbiology* 2002; 40(11):4056-4059

<sup>19</sup> Pisani E, Girault P, Gultom M, Sukartini N, Kumalawati J, Jazan S, Donegan E. HIV, syphilis infection, and sexual practices among transgenders, male sex workers, and other men who have sex with men in Jakarta, Indonesia. *Sexually Transmitted Infections* (2004);80:536-540.

<sup>20</sup> Hawkes S, Morison L, Chakraborty J, Gausia K, Ahmed F, Islam SS, Alam N, Brown D, Mabey D. Prevalence and risk factors for Reproductive Tract Infections in men and women in Matlab, rural Bangladesh. *Bulletin WHO*, 2002;80:180-188

<sup>21</sup> Franceschi, S, Smith J, van den Brule A, Herrero R, Arslan A, Anh P et al. Cervical Infection With *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in Women From Ten Areas in Four Continents: A Cross-Sectional Study. *Sexually Transmitted Diseases* 2007;34(8): pp 563-569

<sup>22</sup> Gorbach, P.M., et al., *Sexual bridging by Cambodian men: potential importance for general population spread of STD and HIV epidemics*. *Sex Transm Dis*, 2000. 27(6): p. 320-6.

<sup>23</sup> Kerrigan D, Moreno L, Rosario S, Gomez B, Jerez H, Barrington C, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican republic. *J Public Health* 2006;96(1):120-125.

<sup>24</sup> Rhodes, T, Simic M, Baros S et al. Police violence and sexual risk among female and transvestite sex workers in Serbia: qualitative study. *BMJ* 2008; 337: 811-

<sup>25</sup> Panchanadeswaran, S; Johnson, SC; Sivaram, S, et al Intimate partner violence is as important as client violence in increasing street-based female sex workers' vulnerability to HIV in India *International Journal of Drug Policy*, 2008;19(2):106-112

- 
- <sup>26</sup> Wojcicki, JM "She drank his money": Survival sex and the problem of violence in taverns in Gauteng Province, South Africa *Medical Anthropology Quarterly* 2002;16(3):267-293
- <sup>27</sup> Molitor F, Ruiz JD, Klausner JD, McFarland W. History of forced sex in association with drug use and sexual HIV risk behaviors, infection with STDs, and diagnostic medical care - Results from the young women survey. *Journal of Interpersonal Violence* 2000; 15(3):262-278
- <sup>28</sup> Friedman MS, Marshal MP, Stall R, Cheong J, Wright ER. Gay-related Development, Early Abuse and Adult Health Outcomes among Gay Males. *AIDS and Behaviour* 2008;12(6):891-902
- <sup>29</sup> Gangopadhyay, DN; Chanda, M; Sarkar, K, et al. Evaluation of sexually transmitted diseases/human immunodeficiency virus intervention programs for sex workers in Calcutta, India *Sexually Transmitted Diseases* 2005 32(1):680-684  
<http://www.nacp.gov.pk/wp-content/uploads/2008/01/r-2-report.pdf>  
Accessed 26<sup>th</sup> Aug 08
- <sup>30</sup> Jana S, Basu I, Rotheram-Borus MJ, Newman PA The Sonagachi Project: A sustainable community intervention program *AIDS Education and Prevention*. 2004; 16(5):405-414
- <sup>31</sup> Kerrigan D, Telles P, Torres H, Overs C, Castle C. *Community development and HIV/STI-related vulnerability among female sex workers in Rio de Janeiro, Brazil*. *Health Educ Res*. 2008;23(1):137-45.
- <sup>32</sup> *HIV Second Generation Surveillance in Pakistan. National Report Round II*. 2006-7. National AIDS Control Programme, Ministry of Health, Pakistan.
- <sup>33</sup> Baqi S, Shah SA, Baig MA, Mujeeb SA, Memon A. Seroprevalence of HIV, HBV and syphilis and associated risk behaviours in male transvestites (Hijras) in Karachi, Pakistan *International Journal of STD & AIDS* 1999; 10: 300- 304
- <sup>34</sup> Low N, Broutet N, Yaw Sarkodie A, Hossain M, Barton P, Hawkes S. Global control of sexually transmitted infections. *Lancet*. 2006;368(9551):2001-16.
- <sup>35</sup> Coates TJ, Richter L, Caceres C. Behavioural strategies to reduce HIV transmission: how to make them work better. *Lancet* 2008; published online
- <sup>36</sup> Padian N, Buve A, Balkus J, Serwadda D, Cates W. Biomedical interventions to prevent HIV infection: evidence, challenges and way forward. *Lancet* 2008, published online.
- <sup>37</sup> Rao Gupta G, Parkhurst J, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. *Lancet* 2008.

---

<sup>38</sup> Buse K, Martinhilber A, Widyanoro N, Hawkes S. Management of the politics of evidence-based sexual and reproductive health policy. *Lancet*. 2006;368(9552):2101-3