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Why don't key populations access HIV counselling and testing centers in Nepal? Findings based on national surveillance survey

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ABSTRACT

Objectives: To assess the demographic, behavioural, structural and psychosocial factors associated with non-utilization of HIV testing and counselling centers (HTC) by female sex workers (FSWs) and men who have sex with men/ transgender (MSM/TGs).

Methods: This study involved a cross-sectional design. We used the national surveillance survey data of 2012 which included 610 FSW and 400 MSM/TG recruited randomly from 22 and 3 districts of Nepal respectively. Adjusted prevalence ratio (aPR) and 0.95 CI using modified Poisson regression was used to assess and infer the association between independent and outcome (non-utilization of HTC in last year) variables.

Results: Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG. The significant factors for non-utilization of HTC among FSW were: depression [aPR=1.4 (1.1-1.6)], injectable drug abuse (ever) [aPR=1.4 (1.1-1.8)], participation (ever) in HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in previous year [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1 (1.0-1.3)]. Non-utilisation of HTC among MSM/TG had significant association with age 16-19 years [aPR=1.4 (1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4), participation (ever) in HIV awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-3.1)], experience of forced sex in previous year [aPR=0.5 (0.3-0.9)]

Conclusion: Although limited by cross-sectional design, we found many programmatically relevant findings. Creative strategies should be envisaged for effective behavioural change communication to improve access to HIV testing. Psychosocial and structural interventions should be integrated with HIV prevention programmes to support key populations in accessing HIV testing.

Summary – strengths and limitations of this study

1. In the Nepal IBBS 2012 survey, psychosocial and structural factors were added.

2. This is the first study to explore the relation of psychosocial and structural factors with HTC non-utilization using IBBS 2012 data among FSW and MSM/TG in Nepal

3. Social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables.

4. Cross-sectional design itself could result in difficulties in ascertaining temporality between various factors studied and non-utilization of HTC.

INTRODUCTION

Globally, at the end of 2015, an estimated 36.7 million people were living with HIV of which 47% did not know their HIV status and hence were deprived of antiretroviral therapy and care [1]. According to UNAIDS 90-90-90 target, by 2020, 90% of all individuals living with HIV should know their HIV status, 90% of all individuals with diagnosed HIV infection should receive sustained antiretroviral therapy, and 90% of all individuals receiving antiretroviral therapy should have viral suppression. By 2030 the AIDS epidemic will come to an end if these three targets are achieved [2].

The key population are those who have a high risk of acquiring or transmitting HIV. Global studies have shown that key populations are 13 to 22 times more likely to be infected with HIV than the general population [3]. Key population includes female sex workers (FSW) and men who have sex with men (MSM)/ transgender (TG) [4]. FSW and MSM/TG are 13-14 times more likely to be infected with HIV than the general population [5].

World Health Organization (WHO) recommended integrated biological and behavioural surveillance survey (IBBS) to monitor HIV prevalence and risk behaviours among key populations. In 1999, IBBS was started by Government of Nepal as part of response plan against HIV/AIDS epidemic [6].

HIV testing and counselling (HTC) is the entry point for HIV care services in Nepal and are provided free of cost to all. National consolidated guidelines for preventing and treating HIV in Nepal had recommended various approaches for maximising HIV testing in both facility and community-based settings [4]. Different surveillance surveys conducted in Nepal found that that the non-utilization of HTC was around 50% in FSWs and MSM/TG.

There was a substantial decline in the proportion of FSW visiting HTC in 2016 compared to 2012 as revealed by IBBS 2016 [7]. Among FSW, decreasing trend in HIV

prevalence was accompanied by an increasing trend in lack of comprehensive knowledge regarding HIV and the downward trend of carrying a condom consistently [7,8]. The UNAIDS target of 90% assessment of HIV status by 2020 might not be reached in Nepal unless factors associated with non-utilization of HTC are identified and addressed [2,9,10]. Psychosocial variables like distress/severe depression were included only in IBBS 2012 survey and were found to be over 50 percent of the key population (FSW and MSM/TG) studied [8,11,12]. Psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of HIV-related risk behaviours among FSW and MSM/TG [13,14].

Therefore using the IBBS 2012 data, we aimed to determine the demographic, behavioural, structural and psychosocial risk factors associated with non-utilization of HTC services in last one year by FSW and MSM/TG in Nepal.

METHODS

Study design

This study was a cross-sectional study involving secondary data of FSW and MSM/TG collected from IBBS survey of 2012 in Nepal.

Setting

Nepal, with a population of 27 million, is a low-middle income, land-locked country in South-East Asia [15]. It shares borders with China in the north and India to the south, east and west. Nepal is divided into 75 districts and consists of Himalayan mountainous region in the north and open terrain (*Terai* in local language) in the south. HTC service was first started in Nepal in 1995 by the National programme for AIDS and sexually transmitted disease. There are over 235 HTC service sites in Nepal as of July 2016.

HTC in Nepal

In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to identify people living with HIV and link them to treatment. It is voluntary and provided free of cost. Health facilitators should maintain confidentiality and obtain informed consent during pre and post-test counselling. According to national guidelines, key populations are expected to visit HTC in every 6-12 months [6]. Besides that, community-based interventions are also prioritised in which peer educators and outreach workers are mobilized in the community. Peer educators, trained by outreach workers, are volunteers who convey crucial information (proper condom use, HIV testing, etc.) to key populations in informal (cruising areas like bus park or public park) and formal setting (drop-in centers) through HIV awareness programmes, AIDS days, condom days, workshops/discussion on HIV, demonstration on condom use etc.

IBBS 2012 Survey, Nepal

National Centre for AIDS and STD control (NCASC), Nepal, conducted two separate cross-sectional IBBS studies between September and November 2012 for FSW and MSM/TG respectively. FSWs were defined as "*women aged 16 years and above reporting to have been paid in cash or kind for sex with a male within the last six months*." MSM/TG were defined as *"those males aged 16 years or above who have had sexual relations (either oral or anal) with another male in the 12 months preceding the survey*."(7). A survey among FSW was conducted in 22 *Terai* highway districts and for MSM/TG in three districts of Kathmandu valley **(figure 1).**

Study population and sampling

The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of clusters and stage 2 was the random selection of an equal number of participants from each selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30 sex workers in that area; those with fewer than 30 sex workers were merged with nearby locations to form a cluster. To identify clusters, mapping was performed in collaboration with service providers from local non-governmental organizations and community leaders to determine areas where sex work is common, and noting the estimated number of possible survey participants in each area. Seventy clusters out of a total of 401 clusters were selected based on probability proportionate to size (PPS).

The MSM were recruited using respondent driven sampling (RDS) in consultation with relevant stakeholder and motivators. To begin with, a total of eight MSM/TG were recruited as seed. Those seeds were informed about survey protocols and procedure and were encouraged to recruit other eligible individuals from their social networks randomly to participate in survey. These initial seeds were provided three coupons to pass to their peers who are eligible to participate in survey.

Detailed methodology and sampling strategies for IBBS surveys have been described previously [8,11–13].

Data variables for the present study

IBBS survey included information on behavioural factors like uptake of interventions for HIV, demographic, behavioural, structural and psychosocial variables [8,11,12]. Structural factors included environmental/context conditions which were outside the control of the individual, but which could influence his/her perceptions, behaviour and health [16]. Psychosocial variables (social support and depression) were assessed using social support questionnaire short form (SSQS) and centre for epidemiological studies depression (CES-D) scale respectively. Median score of <5 in SSQS scale was interpreted as 'dissatisfied with social support'. CES-D scale more than 16 and 22 were to classify distress and depression respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of demographic, behavioural, structural and psychosocial factors have been summarized in **web-only table 1**.

A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was chosen as the outcome variable. The independent variables (demographic, behavioural, structural and psychosocial risk variables) selected in this study have been described in web-only box 1.

Analysis and statistics

Data analysis was done separately for FSW and MSM/TG. Data was analysed using STATA (version 12.1 STATA Corp., College Station, TX, USA). Categorical variables were described using frequency and proportions. The unadjusted and adjusted analysis was performed separately for FSW and MSM/TG to assess the association of factors with the outcome (not utilising HTC in last one year). All the RDS-related descriptive output were

adjusted to represent the structure of the study population (MSM/TG) which was based on information regarding who recruited whom, and the relative size of the respondent's network using the Volz–Heckathorn estimator (RDS II) (20). Adjustment for clustering was not required in FSW data as it was a self-weighted sample.

Variables with a p-value of <0.2 in the unadjusted analysis were included in the regression model (enter method) after assessment for multicollinearity using variance inflation factor. The variables included for FSW were age group, educational status, condom use in last sex, 'ever' participated in HIV program, distress/depression and suicidal thought 'ever'. For MSM/TG, the variables included were educational status, condom use in last sex, 'ever' participated in HIV program, distress/depression and suicidal thought 'ever'. Adjusted prevalence ratios (aPR) with 95% confidence intervals (CI) were calculated by fitting Poisson regression with robust variance estimates.

Ethical Considerations

Ethics approval for IBBS survey 2012 was given by the Nepal Health Research Council (NHRC), Kathmandu, Nepal. Ethics approval for the analysis of secondary data for this study was taken in 2016 from Ethics Advisory Group, the International Union Against Tuberculosis and Lung Disease (The Union), Paris, France. Administrative approval was also received from NCASC and Public Health and Environment Research Center (PERC) Nepal. Waiver of informed consent was sought and approved by the ethics committee as this study involved analysis of secondary data.

RESULTS

IBBS survey 2012 included 610 FSW and 400 MSM/TG with HIV prevalence of 1 and 3.8 percent respectively. The proportion of FSW and MSM/TG in the age group 16 to 19 was 13.9% and 17.2% respectively. Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG. Other characteristics of the study population are presented in web-only table 1. The factors associated with non-utilisation of HTC in last one year among FSW and MSM/TG are summarised in **Table 1** and **Table 2** respectively.

The risk factors for non-utilisation of HTC in last one year among FSW were: injection of drugs (ever), participation (ever) in HIV awareness programmes, an episode of forced sex in last one year, the absence of dependents in the family and distress/depression.

The risk factors for non-utilisation of HTC in last one year among FSW were: young age (16-19 years), no condom use in last sex, participation (ever) in HIV awareness programs, physical assault in last year and not having forced sex in last year.

Table 1. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centers among female sex workers surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		Total N	HTC not Utilized[@] n(%)^	Adj PR**
Total		**610**	**330(54)**	
Demographic				
Age in years	16-19	85	51 (60)	1.0 (0.8-1.2)
	20-24	130	73(56)	1.0 (0.7-1.2)
	>25	395	206 (52)	Ref.
Educational Status	Illiterate	196	98 (50)	0.9(0.7-1.0)
	Literate	414	232 (56)	Ref.
Marital Status	Married	360	197 (55)	Ref
	Unmarried	102	60 (59)	-
	Separated/ Divorced	148	73 (49)	-
Behavioural				
Condom use in last sex	Yes	461	256(56)	Ref.
	No	149	74(32)	0.9(0.7-1.0)
Ever inject drugs	Yes	40	29(73)	1.4(1.1-1.8)*
	No	570	301(53)	Ref.
Structural				
Ever participated in HIV awareness programs	Yes	169	102(52)	1.2(1.0-1.4)*
	No	441	228(60)	Ref.
Physical assault in last year	Yes	81	36 (44)	0.8 (0.6-1.0)
	No	529	294 (56)	Ref.
Housing Instability	Homeless	15	6 (40)	-
	Own home	320	169 (53)	-
	Rented	275	155 (56)	
Forced sex in last year	Yes	125	84 (67)	1.1(1.0-1.3)*
	No	485	246 (51)	Ref.
Having dependents	Yes	341	169 (50)	Ref.
	No	269	161 (60)	1.1(1.0-1.3)*
Police detention in last 6 months	Yes	81	37 (46)	0.8(0.6-1.0)
	No	529	293 (55)	Ref.
Client refusal to pay in last year	Yes	153	89 (58)	-
	No	457	241 (53)	-
Psychosocial				
Stigma towards HIV	Yes	295	168(57)	1.0(0.9-1.2)
	No	315	162(51)	Ref.
Suicidal thoughts (Ever)	Yes	210	117(56)	-
	No	399	212 (53)	-
Depression[#]	Euthymic	342	159 (46)	Ref.
	Distressed	156	100 (64)	1.4(1.1-1.5)*
	Depressed	112	71 (63)	1.4(1.1-1.6)*
SSQS^	Satisfied	530	289(55)	-
	Dissatisfied	80	41(51)	-

[@]Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity checked; [#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

Table 2. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centers among Men having Sex with Men/Transgender surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		N	HTC not Utilized[@] n(%)	Adj PR**
Total		**400**	**221(55)**	
Demographic factors				
Age in years	16-19	69	54(78)	1.4(1.1-1.7)*
	20-24	129	73(57)	1.1(0.9-1.4)
	>25	202	94(47)	Ref
Educational Status	Illiterate	13	7(54)	-
	Literate	387	214(55)	-
Marital Status	Unmarried	289	163(56)	-
	Married	111	58(52)	-
Behavioural				
Condom use in last sex	Yes	339	177(72)	Ref.
	No	61	44(52)	1.2(1.0-1.4)*
Drinking Alcohol	Yes	323	186(58)	1.2(0.9-1.5)
	No	77	35(45)	Ref.
Structural				
Ever Participated in HIV awareness programs	Yes	185	62(34)	1.6(1.3-2.0)*
	No	215	159(74)	Ref.
Physical assault in last year	Yes	57	10(18)	1.8(1.0-3.1)*
	No	343	211(62)	Ref.
Housing instability	Homeless	8	4(50)	-
	Own home	75	42(56)	-
	Rented	317	175(55)	-
Forced sex in last year	Yes	52	10(19)	0.5(0.3-0.9)*
	No	348	211(61)	Ref.
Discrimination in Job	Yes	79	17(22)	Ref.
	No	321	204(64)	1.3(0.8-2.2)
Psychosocial factors				
Stigma towards HIV	Yes	253	138(54)	-
	No	147	83(56)	-
Suicidal thought Ever	Yes	107	33(31)	0.7(0.5-1.0)
	No	293	188(64)	Ref.
Depression[#]	Euthymic	220	121(59)	-
	Distressed	83	49(53)	-
	Depressed	97	51(55)	-
SSQS^	Satisfied	390	216(55)	-
	Dissatisfied	10	5(50)	-

@ Not utilised in last one year; * $p<0.05$; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with $p<0.2$ included in model and collinearity checked; [#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score

DISCUSSION

In IBBS 2012 survey, in addition to individual level variables, psychosocial and structural factors were added. To the best of our knowledge, this study is the first to explore the relation of psychosocial and structural factors with HTC non-utilization among FSW and MSM/TG in Nepal. This study found different risk factors for non-utilization of HTC in last one year among FSW and MSM/TG. They were demographic: late adolescents (MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG), forced sex in last one year (risk factor among FSW and protective factor among MSM/TG), absence of dependent members (FSW), physical assault in last year (MSM/TG); and psychosocial: being distressed/depressed (FSW).

Psychosocial factors play an important role in health services utilisation [14]. FSWs who had distress or depression (one in two FSWs) had a higher prevalence of non-utilization of HTC. This could have resulted in disempowerment and thereby resulting in not accessing HTC services when needed [11,12]. Studies have found that FSWs used alcohol and drugs, to reduce stress and to help them cope with their work [17,18]. Gambian study showed that women who experienced forced sex reported severe depression [19].

Old MSM/TGs were found to use condoms more when compared to younger ones. The median age of first sexual intercourse being 16 years and the fact that the old adolescents (16-19 years) MSM/TGs did not significantly access HTC is a cause of concern [8,11]. The risk-taking behaviour in adolescence can compound their risk in acquiring HIV, and hence this group need to be targeted.

Not visiting an HTC facility was also associated with not using a condom during last sex among MSM/TGs. Injectable drug abuse and not having dependent members among

FSWs were associated with non-utilization of HTC. These high-risk groups deserve urgent attention.

Some factors affecting utilisation of HTC by MSM/TGs were different from that of FSWs. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs among FSWs. Among MSM/TGs, the experience of forced sex led to utilisation of HTC. IBBS survey revealed that the perception of HIV risk by key population was related to condom use, which was higher among MSM/TGs when compared to FSWs. Three-fourths of MSM/TG believed they were at little or no risk of HIV if condoms were used [8]. This could explain the different effects forced sex experience had on HTC utilization among FSW and MSM/TGs.

Participation in HIV awareness programmes by key population showed decreasing trend over the years [8,11]. Participation as a risk factor for non-utilisation of HTC for both FSW and MSM/TG seemed intriguing. In Nepal, the major component of a prevention programme is awareness raising activities. Educators taught key population on modes of HIV transmission, consistent and correct use of condoms and STI prevention. It is seen that interaction with peer educators was higher in MSM/TGs compared to FSWs [8,11]. The activities which enlisted more participation were short duration events like condom/AIDS day celebration compared to effective training methods like demonstration classes, workshops, etc. that provide a platform for deeper understanding of HIV risks **(web-only table 1)**. HIV prevention programme seemed to revolve around the promotion of condom with peer educators and popular HIV/AIDS messages focusing on condom-related messages and activities. Hence participation in awareness classes resulted in high condom use and the fact that two-thirds of MSM/TGs and FSWs were tested for HIV at some point in time could have narrowed their risk perception to a low level as well as decreased their felt need to access HTC. The other explanation for this could be the cross-sectional nature of data. Those who

had visited an HTC in last one year might not have felt the need for attending HIV awareness programmes.

Despite being limited by a cross-sectional design, the findings of this study bring out three major policy implications. First, psychosocial support needs to be an integral part of programmes for FSW and MSM/TG at all levels. HTC should be developed as an empowerment centre lending psychosocial and treatment support rather than being a centre for testing alone. Second, HIV prevention programmes in Nepal need to go beyond condom promotion. Creative strategies should be envisaged for effective behavioural change communication. Third, specific prevention programmes should be rolled out to reach key population at specific risks considering contextual/demographic differentials between key populations, say for example young MSM/TGs.

Our study adhered to STROBE guidelines for conduct and report of the study [20]. The findings are generalizable to FSWs and MSM/TGs of Nepal as standard sampling strategy was followed for the IBBS survey [8,11–13]. The present study had inherent limitations of analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in last 12 months among MSM/TG) could not be included in the analysis due to missing data. The limitations of the original survey like social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables. The cross-sectional design itself could result in difficulties in ascertaining temporality between various factors studied and non-utilization of HTC.

CONCLUSION

To conclude, the psychosocial and structural factors are influencing utilisation of HIV testing and counselling centers among FSW and MSM/TG in Nepal. In addition to focussing

on these risk factors, there is a need to empower HTCs to lend psychosocial support to the key population. Creative behaviour change and communication strategies should be ensured to overcome the limitations of current awareness programmes for key populations.

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Competing interest: None

Contributors: RS, SP, HDS and KD were involved in conception and design of the study; all authors were involved in analysis and interpretation of data; RS prepared the first draft, and all authors were involved in critically reviewing the draft and approving the final draft for submission.

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Figure Legend

Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal.

Figure footnote

**MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers*

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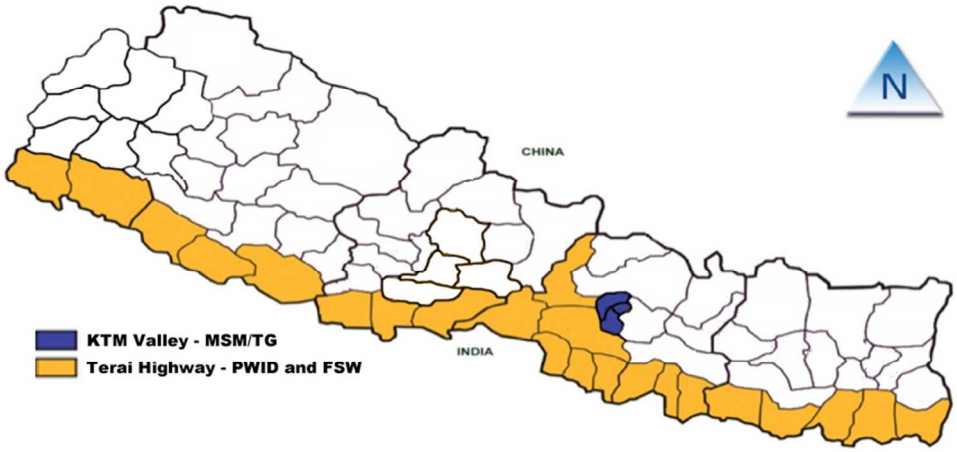

Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal.

Figure footnote
*MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers

Web-only box 1. Independent variables used in this study from the IBBS 2012survey among FSW and MSM/TG to determine Uptake of HTC, Nepal.

Demographic Factors: Age, Educational Status, Marital Status

Behavioural Factors: Condom Use last sex, Ever inject drug, Drinking alcohol

Structural Factors:

- ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever participated in HIV programs, Having dependent, Police detention in last 6 months, Physical assault last year, Client refusal to pay after sex in last year
- ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical assault last year, Experienced forced sex in last year, Discrimination in Job

Psychosocial Factors:

- ✓ Among FSW:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)
- ✓ Among MSM/TG:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)

Web-only table 1. Prevalence of demographic, psychosocial and structural factors among FSW and MSM/TG, IBBS 2012 Nepal.

Factors		FSW N (%)	MSM/TG N (%)
Total		610 (100)	400 (100)
Demographic			
	Age in years		
	16-19	85 (14)	69 (17)
	20-24	130 (21)	129 (32)
	≥25	395(65)	202 (51)
	Illiterate	196(32)	13(3)
	Married	360(59)	111(28)
Behavioural			
	Use of condom with most recent client	461(75)	339(85)
	Consistent condom use	236(59)	344(86)
Structural			
	Having dependents in family	341(56)	192(79)
	Own home	311(51)	75(19)
	Forced sex in last one year	125(20)	52(13)
	Knowledge regarding confidential HTC	397(65)	291(73)
	Participated in discussion in HIV	84(29)	192(79)
	Participated in HIV awareness program	169(28)	185(46)
	Participated in AIDS day	238(39)	208(52)
	Participated in Condom Day	207(34)	220(55)
	Participated in Workshop for HIV	110(18)	68(17)
	Received demonstration on Condon Use	61(10)	44(11)
	Comprehensive Knowledge on condom	122(20)	240(60)
Psychosocial			
	Stigma	295(48)	253(63)
	Suicidal thought	210(34)	107(27)
	Distressed / Depressed	268 (44)	171(43)
	SSQS^		
	Satisfied	530(87)	390(97)
	Dissatisfied	80(3)	10(3)

*MSM/TG – Men who have sex with men/transgender, FSW – female sex workers, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Current paper
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Done. In abstract. Line 26
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Done. Line 23-44
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Done. Line 64-94
Objectives	3	State specific objectives, including any pre-specified hypotheses	Done. Line 95-97. There was no pre-specified hypothesis. We wanted to explore the risk factors for non-utilization of HIV testing centre.
Methods			
Study design	4	Present key elements of study design early in the paper	Done. Line 109-111
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Done. Line 112-138
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Done. Line 157-172

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Done. Line 110-111 and 157-171. Comparability described in lines 183-190.
Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
Study size	10	Explain how the study size was arrived at	Line 139-156
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Done. Line 173-190.
		(*b*) Describe any methods used to examine subgroups and interactions	Lines 183-190.
		(*c*) Explain how missing data were addressed	Not applicable.
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	Lines 178-182
		(*e*) Describe any sensitivity analyses	Not applicable.

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Line 203-204
		(b) Give reasons for non-participation at each stage	Not applicable
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Done. Line 204-207
		(b) Indicate number of participants with missing data for each variable of interest	No missing data
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Done. 205-206
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Lines 209-214
		(*b*) Report category boundaries when continuous variables were categorized	Lines 162-166
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	Done. Line 239-248
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Done. Line 300-306
Interpretation	20	Give a cautious overall interpretation of	Done. Line 309-312

		results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	Done. Line 299-300
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Done. Line 315-333

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Why don't key populations access HIV testing and counselling centres in Nepal? Findings based on national surveillance survey

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Why don't key populations access HIV testing and counselling centres in Nepal? Findings based on national surveillance survey

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Keywords: Key populations; HIV voluntary testing and counselling; MSM; Transgender;FSW; SORT IT; Nepal

ABSTRACT

Objectives: To assess the demographic, behavioural, psychosocial and structural factors associated with non-utilization of HIV testing and counselling centres (HTC) by female sex workers (FSW) and men who have sex with men/ transgender (MSM/TG).

Methods: This study involved a cross-sectional design. We used the national surveillance survey data of 2012 which included 610 FSW and400 MSM/TG recruited randomly from 22 and three districts of Nepal respectively. Adjusted prevalence ratio (aPR)and 0.95 confidence interval (CI) using modified Poisson regression was used to assess and infer the association between outcome (non-utilization of HTC in last year) and independent variables.

Results: Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG. The significant factors for non-utilization of HTC among FSW were: depression[aPR=1.4(1.1-1.6)], injectable drug abuse (ever) [aPR=1.4(1.1-1.8)], participation (ever) in HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in previous year [aPR=1.1 (1.0-1.3)] andabsence of dependents in the family [aPR=1.1(1.0-1.3)]. Non-utilisation of HTC among MSM/TG had significant association with age 16-19 years [aPR=1.4(1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4), participation (ever) in HIV awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-3.1)], experience of forced sex in previous year [aPR=0.5(0.3-0.9)]

Conclusion: Although limited by cross-sectional design, we found many programmatically relevant findings. Creative strategies should be envisaged for effective behavioural change communicationto improve access to HIV testing. Psychosocial and structural interventions should be integrated with HIV prevention programmes to support key populations in accessing HIV testing.

Summary – strengths and limitations of this study

1. In the Nepal IBBS 2012 survey, psychosocial and structural factors were added.

2. This is the first study to explore the relation of psychosocial and structural factors with HTC non-utilization among FSW and MSM/TG in Nepal

3. Social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables.

INTRODUCTION

Globally, at the end of 2015, an estimated 36.7 million people were living with HIV of which 47% did not know their HIV status and hence were deprived of antiretroviral therapy and care[1]. According to UNAIDS 90-90-90 target, by 2020, 90% of all individuals living with HIV should know their HIV status, 90% of all individuals with diagnosed HIV infection should receive sustained antiretroviral therapy, and 90% of all individuals receiving antiretroviral therapy should have viral suppression. By 2030 the AIDS epidemic will come to an end as public health threat if these three targets are achieved[2].

The key population are those who have a high risk of acquiring or transmitting HIV. Global studies have shown that key populations are 13 to 22 times more likely to be infected with HIV than the general population[3]. Key population includes female sex workers (FSW) and men who have sex with men (MSM)/ transgender (TG)[4].FSW and MSM/TGare13-14 times more likely to be infected with HIV than the general population[3].

World Health Organization (WHO) recommended integrated biological and behavioural surveillance (IBBS) survey to monitorHIV prevalence and risk behaviours among key populations. In the late 90s, IBBS was started by Government of Nepal as part of response plan against HIV/AIDS epidemic[5].HIV testing and counselling (HTC) is the entry point for HIV care services in Nepal and are provided free of cost to all.HTC is a critical intervention in achieving the first 90, i.e., people living with HIV should know their HIV status. Though the first step is crucial in identifying people living with HIV, the retention in care of PLHIV in second 90 and third 90 is equally necessary to maximise the treatment and prevention benefits of antiretroviral therapy[6,7]. National consolidated guidelines for preventing and treating HIV in Nepal had recommended various approaches formaximisingHIV testing in both facility and community-based settings[4,5]. Different

surveillance surveys conducted in Nepal found that the non-utilization of HTC was low, i.e., around 50%in FSW and MSM/TG[8].

There was a substantial decline in the proportion of FSW visiting HTC in 2016 compared to 2012 as revealed by IBBS 2016 [9]. Among FSW, decreasing trend in HIV prevalence was accompanied by an increasing trend in lack of comprehensive knowledge regarding HIV [9,10]. The UNAIDS target of 90% assessment of HIV status by 2020 might not be reached in Nepal unless factors associated with non-utilization of HTC are identified and addressed [2,11,12].

Psychosocial variables like distress/ depression were included only in IBBS 2012 survey and were found to be high(around 50 percent)of the key population(people who inject drugs, FSW and MSM/TG) studied[10,13,14].Different studies demonstrate that the psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of HIV-related risk behaviours amongFSW and MSM/TG in Nepal [15,16]. Studies conducted outside of Nepal (India and USA)among key populations (MSM and FSW) found that the psychosocial (depression, substance abuse, violence) and structural factors not only increase their risk behaviours but also lowers the uptake of behavioural interventions.[17–19]. The identification of effects of psychosocial and structural factors in the uptake of HTC would help us to improve existing challenges of reaching key populations in Nepal. However such evidence is very limited in Nepal. Therefore using the IBBS 2012 data, we aimed to determine the demographic, behavioural, psychosocial and structural risk factors associated with non-utilization of HTC in last one year byFSW and MSM/TG in Nepal.

METHODS

Study design

This study was a cross-sectional study involving secondary data of FSW and MSM/TG collected from IBBS survey of 2012 in Nepal.

Setting

Nepal, with a population of 27 million, is a low-middle income, land-locked country in South-East Asia[20]. It shares borders with China in the north and India to the south, east and west. Nepal is divided into 75 districts and consists of a Himalayan mountainous region in the north and open terrain (*Terai*inlocal language) in the south. HTC service was first started in Nepal in 1995 by theNational programme for AIDS and sexually transmitted disease. There are over 235 HTC service sites in Nepal as of July 2016.

HTC in Nepal

In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to identify people living with HIV and link them to treatment. It is voluntary and provided free of cost.Health facilitators should maintain confidentiality and obtain informed consent during pre and post-test counselling.According to national guidelines, key populations are expected to visit HTC in every 6-12 months[5]. Besides that,community-based interventions are also prioritised in which peer educators and outreach workers are mobilised in the community. Peer educators are volunteers who convey crucial information (proper condom use, HIV testing, etc.) to key populations in informal (cruising areas like bus park or public park) and formal setting (drop-in centres)to distribute condoms, safe needles/ syringes or aware them about available treatment, care and support services.

IBBS 2012 Survey, Nepal

National Centre for AIDS and STD control (NCASC), Nepal, conducted two separate cross-sectional IBBS surveys between September and November 2012 for FSW and MSM/TG respectively. FSWwere defined as "*women aged 16 years and above reporting to have been paid in cash or kind for sex with a male within the last six months*."MSM/TGwere defined as *"those males aged 16 years or above who have had sexual relations (either oral or anal) with another male in the 12 months preceding the survey*."(7). A survey among FSWwas conducted in 22 *Terai*highway districts and for MSM/TG in three districts of Kathmandu valley **(figure 1).**

Study population and sampling

The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of clusters, and stage 2 was the random selection of an equal number of participants from each selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30 sex workers in that area; those with fewer than 30 sex workers were merged with nearby locations to form a cluster. To identify clusters, mapping was performed with the support of local non-governmental organisations to determine areas where sex work is common and noting the estimated number of possible survey participants in each area. Seventy clusters out of a total of 401 clusters were selected based on probability proportionate to size (PPS).

The MSM were recruited using respondent driven sampling (RDS) in three districts of Kathmandu valley (Kathmandu, Lalitpur and Bhaktapur). To begin with, a total of eight MSM/TGwere recruited as seed. Those seeds were informed about survey protocols and procedure and were encouraged to recruit other eligible individuals from their social networks randomly to participate in the survey. These initial seeds were provided three coupons to pass to their peers who are eligible to participate in the survey.

Detailed methodology and sampling strategies for IBBS surveys have been described previously [10,13–15].

Data variables for the present study

IBBS survey included information on behavioural factors like uptake of interventions for HIV, demographic, behavioural, psychosocial and structural variables[10,13,14]. Structural factors included environmental/context conditions which were outside the control of the individual, but which could influence his/her perceptions, behaviour and health [21]. Psychosocial variables (social support and depression) were assessed using social support questionnaire short form (SSQS) and centre for epidemiological studies depression (CES-D) scale respectively. The CES-D tool showed high reliability and validity in assessing depression in diverse groups such as PLHIV, women and MSM with Cronbach's alpha ≥.85 and comparative fit indices more than 0.90[8,22]. The CES-D is extensively normed and validated tool[23]. Similarly the reliability and construct validity of scale SSQS reported high (>0.90) by different studies [24,25].

Median score of <5 in SSQS scale was interpreted as 'dissatisfied with social support'. CES-D scale more than 16 and 22 were to classify distress and depression respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of demographic, behavioural, psychosocial and structural factors have been summaried in **web-only table 1**.

A self-reported visit to an HTC facility in past year by the FSW and MSM/TGwas chosen as the outcome variable.The outcome variable assessed by asking 'Have you visited (Yes vs. No) any HTCcenters in the last 12 months?' (Reasons for visiting: pre-post

HIV/AIDS test counselling, information on HIV/AIDS window period, HIV/AIDS test result, counselling on using condom correctly in each sexual intercourse).In addition to aforementioned reasons, discussion on safe injecting behaviour was also one of the self-reported reasons among PWID for visitingHTCcentre.The independent variables (demographic, behavioural, psychosocial and structural risk variables)selected in this study have been described in web-only box 1.

Analysis and statistics

Data analysis was done separately for FSW and MSM/TG. Data was analysed usingSTATA (version 12.1 STATA Corp., College Station, TX, USA).Categorical variables were described using frequency and proportions. The unadjusted and adjusted analysis was performed separately for FSW and MSM/TG to assess the association of factors with the outcome (not utilising HTC in last one year). All the RDS-related descriptive output were adjusted to represent the structure of the study population (MSM/TG) which was based on information regarding who recruited whom, and the relative size of the respondent's network using the Volz–Heckathorn estimator (RDS II) (20).To assess the network size among MSM/TG, the following question was asked: "How many other MSM/TG do you know who also know you well? (Knowing someone is defined as being able to contact them and having had to contact with them in the past 12 months)."RDS-adjusted values presented in web-only table 2. Convergence plot for outcome variable is presented in web-only figure 1.Adjustment for clustering of two-stage cluster sampling was not required in FSW data as it was a self-weighted sample.

.Bivariate associations between each independent variable and non-utilization of HTC were calculated using variance inflation factor after assessment for multicollinearity.Variables with a p-value of <0.2 in the bivariate analysis were included in the regression model (enter

method). Adjusted prevalence ratios (aPR)with 95% confidence intervals (CI)were calculated by fitting a Poisson regression with robust variance estimates.The variables included in multivariate model (adjusted prevalence ratio)for FSWwereage group, educational status, condom use at last sex, ever inject drugs, ever participated in HIV awareness program,physical assault in last year, forced sex in last year, having dependents, police detention in last 6 months, stigma towards HIV and distress/depression.The variables included in adjusted prevalence ratio forMSM/TG were age group, condom use atlast sex, drinking alcohol, ever participated in HIV awareness programme, physical assault in last year, forced sex in last year, and discrimination in job and suicidal thought 'ever'.

Initially, we used the log-binomial model to assess the association between independent and outcome variable of interest. However, the log-binomial model fails to converge. To overcome the effects of failed convergence, we have used the Poisson regression with robust variance estimates as recommended by the Tyler et al.[26].Poisson regression with robust variance can be used as an alternative of logistic regression and also provides accurate estimates in the cross-sectional study with binary outcome of interest[27]. We have calculated the prevalence ratio because it is easy to interpret than the odds ratio.

Ethical Considerations

Ethics approval for IBBS survey 2012 was given by the Nepal Health Research Council (NHRC), Kathmandu, Nepal.Ethics approval for the analysis of secondary data for this study was taken in 2016 from Ethics Advisory Group, the International UnionAgainst Tuberculosis and Lung Disease (The Union), Paris, France.Administrative approval was also receivedfromNCASC and Public Health and Environment Research Center (PERC) Nepal.Waiver of informed consent was sought and approved by the ethics committee as this study involved analysis of secondary data.

RESULTS

IBBS survey 2012 included 610 FSW with the response rate among FSW was 88.9%. The non-responders were replaced by the randomly selected anotherFSW of the same cluster.TheHIV prevalence was 1percent among FSW.The proportion of FSWin the age group 16 to 19 was 13.9%. The prevalence of non-utilization of HTC in last one year was 54% amongFSW. More than half FSW(59%) were married, 24% of them were divorced or separated. Two-third (68%) of FSWwere literate (Table 1 and web-only Table 1).

IBBS survey 2012 included 400 MSM/TG, and we did not record non-response among MSM/TG because of nature of sampling technique, i.e., study participants enrol the other possible participants in the study. The HIV prevalence was 3.3 percent among MSM/TG. The proportion of MSM/TG in the age group 16 to 19 was 17.2%. Non-utilization of HTC in last one year was 55% for MSM/TG.The majority of the MSM/TG were unmarried (72%) whereas very few of them were illiterate(3%).Other characteristics of the FSW and MSM/TG are presented in web-only table 2.

The factors associated with non-utilisation of HTC in last one year among FSW and MSM/TGare summarised in **Table1** and **Table2**respectively.In multivariable analysis, the association between non-utilisation of HTC and distress/depression remained significant.FSW experiencing distress(APR: 1.4, 95% CI: 1.1–1.5) and depression(APR: 1.4, 95% CI: 1.1–1.6) were more likely to non-utilization of HTC in the past year.SimilarlyFSW who were injecting drugs (ever)(APR: 1.4, 95% CI: 1.1–1.8), ever participated in HIV awareness programmes (APR: 1.2, 95% CI: 1.0–1.4), or no dependents in the family (APR: 1.1, 95% CI: 1.0–1.3) were more likely to non-utilization of HTC.FSW who experienced forced sex (APR: 1.1, 95% CI: 1.0–1.3) in the last 12 months were also more likely to non-utilization of HTC (Table 1). episode

MSM/TG who were adolescents aged 16-19 years(APR: 1.4, 95% CI: 1.1–1.7) and experienced physical assault(APR: 1.8, 95% CI: 1.0–3.1) were more likely to non-utilization of HTC. However, MSM/TG who experienced forced sex(APR: 0.5, 95% CI: 0.3–0.9) were less likely to non-utilization of HTC. MSM/TG who did not use condom during their last sex(APR: 1.2, 95% CI: 1.0–1.4) or participated in HIV awareness programs (APR: 1.6, 95% CI: 1.3–2.0) were more likely to non-utilization of HTC (Table 2).

Table 1. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among female sex workers surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		Total N	HTC not Utilised[@] n(%)	Adj PR**
Total		**610**	**330(54)**	
Demographic				
Age in years	16-19	85	51 (60)	1.0 (0.8-1.2)
	20-24	130	73(56)	1.0 (0.7-1.2)
	>25	395	206 (52)	Ref.
Educational Status	Illiterate	196	98 (50)	0.9(0.7-1.0)
	Literate	414	232 (56)	Ref.
Marital Status	Married	360	197 (55)	Ref
	Unmarried	102	60 (59)	-
	Separated/ Divorced	148	73 (49)	-
Having dependents	Yes	341	169 (50)	Ref.
	No	269	161 (60)	1.1(1.0-1.3)*
Behavioural				
Condom use in last sex	Yes	461	256(56)	Ref.
	No	149	74(32)	0.9(0.7-1.0)
Ever inject drugs	Yes	40	29(73)	1.4(1.1-1.8)*
	No	570	301(53)	Ref.
Structural				
Ever participated in HIV awareness programs	Yes	169	102(52)	1.2(1.0-1.4)*
	No	441	228(60)	Ref.
Physical assault in last year	Yes	81	36 (44)	0.8 (0.6-1.0)
	No	529	294 (56)	Ref.
Housing Instability	Homeless	15	6 (40)	-
	Own home	320	169 (53)	-
	Rented	275	155 (56)	
Forced sex in last year	Yes	125	84 (67)	1.1(1.0-1.3)*
	No	485	246 (51)	Ref.
Police detention in last 6 months	Yes	81	37 (46)	0.8(0.6-1.0)
	No	529	293 (55)	Ref.

Client refusal to pay in last year	Yes	153	89 (58)	-
	No	457	241 (53)	-
Psychosocial				
Stigma towards HIV	Yes	295	168(57)	1.0(0.9-1.2)
	No	315	162(51)	Ref.
Suicidal thoughts (Ever)	Yes	210	117(56)	-
	No	399	212 (53)	-
Depression[#]	Euthymic	342	159 (46)	Ref.
	Distressed	156	100 (64)	1.4(1.1-1.5)*
	Depressed	112	71 (63)	1.4(1.1-1.6)*
SSQS^	Satisfied	530	289(55)	-
	Dissatisfied	80	41(51)	-

[@]Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity checked; [#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

Table 2. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among Men having Sex with Men/Transgender surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		**N**	**HTC not Utilised[@] n(%)[¥]**	**Adj PR****
Total		**400**	**221(55)**	
Demographic factors				
Age in years	16-19	69	54(78)	1.4(1.1-1.7)*
	20-24	129	73(57)	1.1(0.9-1.4)
	>25	202	94(47)	Ref
Educational Status	Illiterate	13	7(54)	-
	Literate	387	214(55)	-
Marital Status	Unmarried	289	163(56)	-
	Married	111	58(52)	-
Behavioural				
Condom use at last sex	Yes	339	177(72)	Ref.
	No	61	44(52)	1.2(1.0-1.4)*
Drinking Alcohol	Yes	323	186(58)	1.2(0.9-1.5)
	No	77	35(45)	Ref.
Structural				
Ever Participated in HIV awareness programs	Yes	185	62(34)	1.6(1.3-2.0)*
	No	215	159(74)	Ref.
Physical assault in last year	Yes	57	10(18)	1.8(1.0-3.1)*
	No	343	211(62)	Ref.
Housing instability	Homeless	8	4(50)	-
	Own home	75	42(56)	-
	Rented	317	175(55)	-
Forced sex in last year	Yes	52	10(19)	0.5(0.3-0.9)*
	No	348	211(61)	Ref.
Discrimination in Job	Yes	79	17(22)	Ref.
	No	321	204(64)	1.3(0.8-2.2)
Psychosocial factors				
Stigma towards HIV	Yes	253	138(54)	-
	No	147	83(56)	-

Suicidal thought Ever	Yes	107	33(31)	0.7(0.5-1.0)
	No	293	188(64)	Ref.
Depression[#]	Euthymic	220	121(59)	-
	Distressed	83	49(53)	-
	Depressed	97	51(55)	-
SSQS^	Satisfied	390	216(55)	-
	Dissatisfied	10	5(50)	-

¥Unweighted descriptive statistics.For RDS-weighted estimates refer to web-only table 2; @Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in model and collinearity checked;[#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

DISCUSSION

In IBBS 2012 survey, in addition to individual level variables, psychosocial and structural factors were added. To the best of our knowledge, this study is the first to explore the relation of psychosocial and structural factors with HTC non-utilization among FSW and MSM/TG in Nepal. The uptake of HTC was low (around 55%) amongMSM/ TG in Nepal which is consistent with the findings of studies conducted in Assam and Andra Pradesh India, Zhejiang province ChinaandBangkokThailand[28–31].Our study also demonstrates a low level of uptake of HTC among PWID in Nepal which is even lower (33%) among PWID of Manipur and Nagaland in India[32]. The current scenario suggests that the low uptake of HTC among MSM/TG and PWID not only threat the timely identification and linking them to treatment to improve their health but also increase the risk of secondary transmission from HIV-infected MSM/TG and PWID to their partners.Community-based HTC with different approaches (mobile testing and door-to-door testing etc.) that found effective in increasing uptake of HTC and linking them to HIV care among MSM/TG and PWID in other settings[33] need to be evaluated in the context of Nepal. Otherwise, the 90-90-90 targets prioritised to improve health and prevention of secondary HIV transmission would not be possible in Nepal. This study also found different risk factors for non-utilization of HTC in last one year among FSW and MSM/TG.They were demographic: late adolescents

(MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG), forced sex in last one year (risk factor among FSW and protective factor among MSM/TG), absence of dependent members (FSW), physical assault in last year (MSM/TG); and psychosocial: being distressed/depressed (FSW).

Psychosocial factors play an important role in health services utilisation [16]. FSWwho had distress or depression (four out of every 10) had a higher prevalence of non-utilization of HTC. This could have resulted in disempowerment and thereby resulting in not accessing HTC services when needed[13,14].Studies have found that FSW used alcohol and drugs, to reduce stress and to help them cope with their work[17,34].Gambian study showed that women who experienced forced sex reported severe depression[35].A study conducted among FSWworking outside of the capital city (Kathmandu) found the very high prevalence of depression and the experience of any form violence (verbal, physical and sexual) was also common among them and also associated with depression[36].Currently, there are no targeted programs that address the mental health problems of FSW in Nepal and lack of laws that protect the rights of sex workers also exacerbating the experience of violence among them. Efforts addressing the experience of violence and its consequences (depression) among FSWareessential in Nepal otherwise it would be difficult to increase uptake of HTC among them.

According to the IBBS survey report of 2012, old MSM/TG were found to use condoms more when compared to younger ones. Similarly, the median age of first sexual intercourse being16 years and the fact that the old adolescents (16-19 years)MSM/TG did not significantly access HTC is a cause of concern[10,13]. The risk-taking behaviour in adolescence can compound their risk in acquiring HIV, and hence this group need to be targeted.In Nepal, the blanket approach to implementing interventions (HTC) without

considering the specific needs of adolescents or young people belonging to key populations might have effects in low uptake of HTC among them. Evidence from China suggests that the use of peer-led community-based rapid HIV test increase the uptake of HIV testing among young MSM[37].

Not visiting an HTC facility was also associated with not using a condom during last sex among MSM/TG.FSW who were injecting drugs were also less likely to uptake HTC in the last 12 months. Our study findings are consistent with the study conducted among FSW in Vietnam where unprotected sex and injecting drug use associated with less likely to have voluntary HIV test [38]. The findings suggest that we are missing to reach those FSW who were at increased risk for HIV due to their dual risky behaviours such as unprotected sex or injecting drug abuse.

Some factors affecting utilisation of HTC by MSM/TG were different from that of FSW. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs among FSW. Among MSM/TG, the experience of forced sex led to the utilisation of HTC. The difference might be due to the fact thatMSM/TG are highly networked population than the FSW[39]suchasmost of them are directly and indirectly associated with their community organisations (Blue Diamond Society) which work for the rights of gender and sexuality minorities in Nepal. That may have resulted to seek available services among MSM/TG after experiencing the sexual abuse.

Participation in HIV awareness programmes by key population showed decreasing trend over the years [10,13]. Participation as a risk factor for non-utilisation of HTC for both FSW and MSM/TG seemed intriguing. The activities which enlisted more participation were short duration events like condom/AIDS day celebration compared to effective training methods like demonstration classes, workshops,etc.**(web-only table 1)**. These aforementioned short-term awareness activities might not have effective in awaringFSW and MSM/TG about

the importance of HTC.The other explanation for this could be the cross-sectional nature of data. Those who had visited an HTC in last one year might not have felt the need for attending HIV awareness programmes.

Despite being limited by a cross-sectional design, the findings of this study bring out three major policy implications.First, the intervention to address the burden of depression needs to be an integral part of programmes for FSW and MSM/TG at all levels. Second, HTC should be developed as an empowerment centre or training to improve their skills that help FSW and MSM/TG to tackle physical and sexual abuse. Third, specific prevention programmes should be rolled out to reach adolescent FSW and MSM/TG,andFSW who were practising dual risk behaviours such as inconsistent condom use or injecting drug use. The HTC centre should also consider the specific needs of adolescent FSW or MSM/TG.

Our study adhered to STROBE guidelines for conduct and report of the study[40]. The findings are generalizable to FSW, and MSM/TG of Nepal as standard sampling strategy was followed for the IBBS survey [10,13–15]. The present study had inherent limitations of analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in last 12 months among MSM/TG) could not be included in the analysis due to missing data. The limitations of the original survey like social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables. The cross-sectional design itself could result in difficulties in ascertaining temporality between various factors studied and non-utilization of HTC.

CONCLUSION

To conclude, the psychosocial and structural factors are influencing utilisation of HIV testing and counselling centres among FSW and MSM/TG in Nepal.In addition to focussing on these risk factors, there is a need to improve HTCs to lend psychosocial support or to

address the need of specific adolescent FSW and MSM/TG or FSW who also inject drugs. Creative behaviour change and communication strategies or interventions to improve skills to tackle physical and sexual abuse should be ensured to overcome the limitations of current programmes for key populations in Nepal.

Acknowledgements

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Competing interest: None

Contributors: RS, SP, HDS and KD were involved in conception and design of the study; all authors were involved in analysis and interpretation of data; RS prepared the first draft, and all authors were involved in critically reviewing the draft and approving the final draft for submission.

Data availability statement: Data is available to the corresponding author and will be provided on request.

Provenance and peer review: Not commissioned; externally peer reviewed.

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Licence statement

Figure Legend

Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal.

Figure footnote

**MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers; KTM valley- Kathmandu valley*

Web-only figure 1.Convergence plot for the outcome of interest.

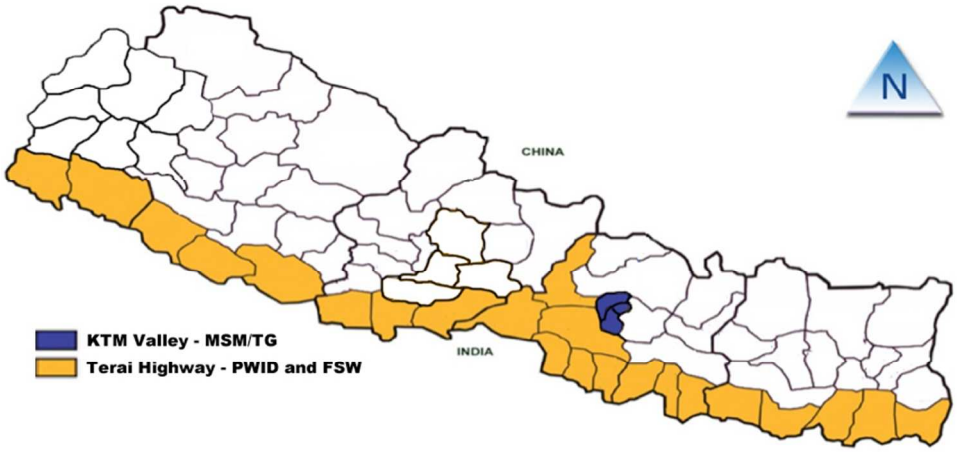
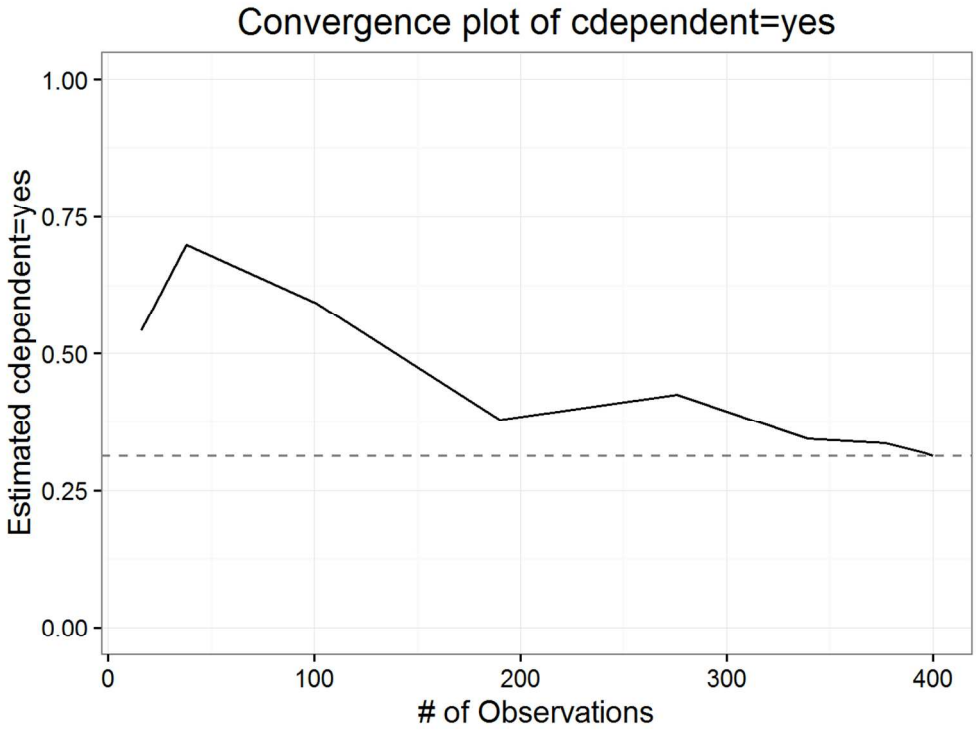


Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal. Figure footnote *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers



Web-only table 1. Prevalence of demographic, psychosocial and structural factors among FSW, IBBS 2012 Nepal.

Factors		FSW N (%)
Total		610 (100)
HIV prevalence		6 (1)
Demographic		
	Age in years	
	16-19	85 (14)
	20-24	130 (21)
	≥25	395(65)
	Illiterate	196(32)
	Married	360(59)
Behavioural		
	Use of condom with most recent client	461(75)
	Consistent condom use	236(59)
Structural		
	Having dependents in family	341(56)
	Own home	311(51)
	Forced sex in last one year	125(20)
	Knowledge regarding confidential HTC	397(65)
	Participated in discussion in HIV	84(29)
	Participated in HIV awareness program	169(28)
	Participated in AIDS day	238(39)
	Participated in Condom Day	207(34)
	Participated in Workshop for HIV	110(18)
	Received demonstration on Condon Use	61(10)
	Comprehensive Knowledge on condom	122(20)
Psychosocial		
	Stigma	295(48)
	Suicidal thought	210(34)
	Distressed / Depressed	268 (44)
	SSQS^	
	Satisfied	530(87)
	Dissatisfied	80(3)

*MSM/TG – Men who have sex with men/transgender, FSW – female sex workers, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

Web-only table 2.Prevalence of demographic, psychosocial and structural factors among MSM/TG, IBBS 2012 Nepal.

Factors		MSM/TG* Frequency (%)	MSM/TG RDS Adjusted (CI)
Total		400 (100)	
	HIV prevalence		3.3 (1.9-5.9)
	HTC not utilized	221(55)	68.6 (54.3-80.1)
Demographic			
	Age in years		
	16-19	69 (17)	17.7(11.5-26.1)
	20-24	129 (32)	31.3(22.5-41.8)
	≥25	202 (51)	51.0(39.2-62.5)
	Illiterate	13(3)	3.1(1.2-7.9)
	Married	111(28)	23.3(16.2-32.2)
Behavioural			
	Condom use in last sex	339(85)	75.8(64.8-84.2)
	Drinking Alcohol	323(81)	81.0(71.3-88.1)
Structural			
	Ever Participated in HIV awareness programs	185(46)	35.6(23.9-49.2)
	Physical assault in last year	57(14)	6.3(3.6-10.8)
	Housing instability		
	Own Home	75(19)	19.9(12.4-30.3)
	Forced sex in last year	52(13)	5.5(3.3-9.1)
	Discrimination in Job	79(20)	5.9(3.9-8.8)
Psychosocial			
	Stigma	253(63)	63.2(52.0-73.2)
	Suicidal thought	107(27)	14.2(9.8-20.1)
	Depression		
	Distressed	83(21)	14.9(10.3-21.1)
	Depressed	97(24)	18.2(11.9-26.7)
	SSQS^		
	Satisfied	390(97)	98.5(96.1-99.4)
	Dissatisfied	10(3)	1.5(0.5-3.8)
Number of seed		8	
Maximum no. of recruitment wave (mean)		8 (3.67)	

*MSM/TG – Men who have sex with men/transgender, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

Web-only box 1. Independent variables used in this study from the IBBS 2012survey among FSW and MSM/TG to determine Uptake of HTC, Nepal.

Demographic Factors: Age, Educational Status, Marital Status, Having dependent

Behavioural Factors: Condom Use last sex, Ever inject drug, Drinking alcohol

Psychosocial Factors:

- ✓ Among FSW: Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)
- ✓ Among MSM/TG:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)

Structural Factors:

- ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever participated in HIV programs, Police detention in last 6 months, Physical assault last year, Client refusal to pay after sex in last year
- ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical assault last year, Experienced forced sex in last year, Discrimination in Job

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Current paper
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Done. In abstract. Line 26
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Done. Line 23-44
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Done. Line 64-94
Objectives	3	State specific objectives, including any pre-specified hypotheses	Done. Line 95-97. There was no pre-specified hypothesis. We wanted to explore the risk factors for non-utilization of HIV testing centre.
Methods			
Study design	4	Present key elements of study design early in the paper	Done. Line 109-111
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Done. Line 112-138
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Done. Line 157-172

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Done. Line 110-111 and 157-171. Comparability described in lines 183-190.
Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
Study size	10	Explain how the study size was arrived at	Line 139-156
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Done. Line 173-190.
		(*b*) Describe any methods used to examine subgroups and interactions	Lines 183-190.
		(*c*) Explain how missing data were addressed	Not applicable.
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	Lines 178-182
		(*e*) Describe any sensitivity analyses	Not applicable.

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Line 203-204
		(b) Give reasons for non-participation at each stage	Not applicable
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Done. Line 204-207
		(b) Indicate number of participants with missing data for each variable of interest	No missing data
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Done. 205-206
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Lines 209-214
		(*b*) Report category boundaries when continuous variables were categorized	Lines 162-166
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	Done. Line 239-248
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Done. Line 300-306
Interpretation	20	Give a cautious overall interpretation of	Done. Line 309-312

		results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	Done. Line 299-300
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Done. Line 315-333

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Why don't key populations access HIV testing and counselling centres in Nepal? Findings based on national surveillance survey

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Why don't key populations access HIV testing and counselling centres in Nepal? Findings based on national surveillance survey

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ABSTRACT

Objectives: To assess the demographic, behavioural, psychosocial and structural factors associated with non-utilization of HIV testing and counselling centres (HTC) by female sex workers (FSW) and men who have sex with men/ transgender (MSM/TG).

Methods: This study involved a cross-sectional design. We used the national surveillance survey data of 2012 which included 610 FSW and400 MSM/TG recruited randomly from 22 and three districts of Nepal respectively. Adjusted prevalence ratio (aPR)and 0.95 confidence interval (CI) using modified Poisson regression was used to assess and infer the association between outcome (non-utilization of HTC in last year) and independent variables.

Results: Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG. The significant factors for non-utilization of HTC among FSW were: depression[aPR=1.4(1.1-1.6)], injectable drug abuse (ever) [aPR=1.4(1.1-1.8)], participation (ever) in HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in previous year [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1(1.0-1.3)]. Non-utilisation of HTC among MSM/TG had significant association with age 16-19 years [aPR=1.4(1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4), participation (ever) in HIV awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-3.1)], experience of forced sex in previous year [aPR=0.5(0.3-0.9)]

Conclusion: Although limited by cross-sectional design, we found many programmatically relevant findings. Creative strategies should be envisaged for effective behavioural change communication to improve access to HIV testing. Psychosocial and structural interventions should be integrated with HIV prevention programmes to support key populations in accessing HIV testing.

Summary – strengths and limitations of this study

1. Psychosocial and structural factors were assessed for the first time in the national surveillance survey of 2012.

2. This is the first study to explore the relation of psychosocial and structural factors with HTC non-utilization among FSW and MSM/TG in Nepal.

3. Social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables.

INTRODUCTION

Globally, at the end of 2015, an estimated 36.7 million people were living with HIV of which 47% did not know their HIV status and hence were deprived of antiretroviral therapy and care[1]. According to UNAIDS 90-90-90 target, by 2020, 90% of all individuals living with HIV should know their HIV status, 90% of all individuals with diagnosed HIV infection should receive sustained antiretroviral therapy, and 90% of all individuals receiving antiretroviral therapy should have viral suppression. By 2030 the AIDS epidemic will come to an end as public health threat if these three targets are achieved[2].

The key population are those who have a high risk of acquiring or transmitting HIV. Global studies have shown that key populations are 13 to 22 times more likely to be infected with HIV than the general population[3]. Key population includes female sex workers (FSW) and men who have sex with men (MSM)/ transgender (TG)[4].FSW and MSM/TGare13-14 times more likely to be infected with HIV than the general population[3].

World Health Organization (WHO) recommended integrated biological and behavioural surveillance (IBBS) survey to monitor HIV prevalence and risk behaviours among key populations. In the late 90s, IBBS was started by Government of Nepal as part of response plan against HIV/AIDS epidemic[5]. HIV testing and counselling (HTC) is the entry point for HIV care services in Nepal and are provided free of cost to all.HTC is a critical intervention in achieving the first 90, i.e., people living with HIV should know their HIV status. Though the first step is crucial in identifying people living with HIV, the retention in care of PLHIV in second 90 and third 90 is equally necessary to maximise the treatment and prevention benefits of antiretroviral therapy[6,7]. National consolidated guidelines for preventing and treating HIV in Nepal had recommended various approaches for maximising HIV testing in both facility and community-based settings[4,5]. Different surveillance surveys

conducted in Nepal found that the non-utilization of HTC was low, i.e., around 50%in FSW and MSM/TG[8].

There was a substantial decline in the proportion of FSW visiting HTC in 2016 compared to 2012 as revealed by IBBS 2016 [9]. Among FSW, decreasing trend in HIV prevalence was accompanied by an increasing trend in lack of comprehensive knowledge regarding HIV [9,10]. The UNAIDS target of 90% assessment of HIV status by 2020 might not be reached in Nepal unless factors associated with non-utilization of HTC are identified and addressed [2,11,12].

Psychosocial variables like distress/ depression were included only in IBBS 2012 survey and were found to be high(40-50 percent) of the key population (people who inject drugs, FSW and MSM/TG) studied[10,13,14].Different studies demonstrate that the psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of HIV-related risk behaviours among FSW and MSM/TG in Nepal [15,16]. Studies conducted outside of Nepal (India and USA) among key populations (MSM/TG and FSW) found that the psychosocial (depression, substance abuse, violence) and structural factors not only increase their risk behaviours but also lowers the uptake of behavioural interventions.[17–19]. The identification of effects of psychosocial and structural factors in the uptake of HTC would help us to improve existing challenges of reaching key populations in Nepal. However such evidence is very limited in Nepal. Therefore using the IBBS 2012 data, we aimed to determine the demographic, behavioural, psychosocial and structural risk factors associated with non-utilization of HTC in last one-year by FSW and MSM/TG in Nepal.

METHODS

Study design

This study was a cross-sectional study involving secondary data of FSW and MSM/TG collected from IBBS survey of 2012 in Nepal.

Setting

Nepal, with a population of 27 million, is a low-middle income, a beautiful landlocked country in South-East Asia[20]. It shares borders with China in the north and India to the south, east and west. Nepal is divided into 75 districts and consists of a Himalayan mountainous region in the north and open terrain (*Terai* in local language) in the south. HTC service was first started in Nepal in 1995 by the National Programme for AIDS and Sexually Transmitted Disease. There are over 235 HTC service sites in Nepal as of July 2016.

HTC in Nepal

In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to identify people living with HIV and link them to treatment. It is voluntary and provided free of cost. Health facilitators should maintain confidentiality and obtain informed consent during pre and post-test counselling. According to national guidelines, key populations are expected to visit HTC in every 6-12 months[5]. Besides that, community-based interventions are also prioritised in which peer educators and outreach workers are mobilised in the community. Peer educators are volunteers who convey crucial information (proper condom use, HIV testing, etc.) to key populations in informal (cruising areas like bus park or public park) and formal setting (drop-in centres). They also distribute condoms, safe needles/ syringes or aware them about available treatment, care and support services.

IBBS 2012 Survey, Nepal

National Centre for AIDS and STD Control (NCASC), Nepal, conducted two separate cross-sectional IBBS surveys between September and November 2012 for FSW and MSM/TG respectively. FSW were defined as "*women aged 16 years and above reporting to have been paid in cash or kind for sex with a male within the last six months*." MSM/TG were defined as *"men aged 16 years or above who have had sexual relations (either oral or anal) with another male in the 12 months preceding the survey*."(7). A survey among FSW was conducted in 22 *Terai* highway districts and for MSM/TG in three districts of Kathmandu valley (Kathmandu, Lalitpur and Bhaktapur) **(figure 1).**

Study population and sampling

The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of clusters, and stage 2 was the random selection of an equal number of participants from each selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30 sex workers in that area; those with fewer than 30 sex workers were merged with nearby locations to form a cluster. To identify clusters, mapping was performed with the support of local non-governmental organisations to determine areas where sex work is common and noting the estimated number of possible survey participants in each area. Seventy clusters out of a total of 401 clusters were selected based on probability proportionate to size (PPS).

The MSM were recruited using respondent driven sampling (RDS) in three districts of Kathmandu valley. To begin with, a total of eight MSM/TG were recruited as seed. Those seeds were informed about survey protocols and procedure and were encouraged to recruit other eligible individuals from their social networks randomly to participate in the survey. These initial seeds were provided three coupons to pass to their peers who are eligible to participate in the survey.

Detailed methodology and sampling strategies for IBBS surveys have been described previously [10,13–15].

Data variables for the present study

IBBS survey included information on behavioural factors like uptake of interventions for HIV, demographic, behavioural, psychosocial and structural variables[10,13,14]. Structural factors included environmental/context conditions which were outside the control of the individual, but which could influence his/her perceptions, behaviour and health [21]. Psychosocial variables (social support and depression) were assessed using social support questionnaire short form (SSQS) and centre for epidemiological studies depression (CES-D) scale respectively. The CES-D tool showed high reliability and validity in assessing depression in diverse groups such as PLHIV, women and MSM with Cronbach's alpha ≥.85 and comparative fit indices more than 0.90[22]. The CES-D is extensively normed and validated tool[23]. Similarly the reliability and construct validity of scale SSQS reported high (>0.90) by different studies [24,25].

Median score of <5 in SSQS scale was interpreted as 'dissatisfied with available social support'. CES-D scale more than 16-21 and ≥22 were to classify distress and depression respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of demographic, behavioural, psychosocial and structural factors have been summarised in **web-only tables 1 and 2**.

A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was chosen as the outcome variable. The outcome variable assessed by asking 'Have you visited (Yes vs. No) any HTC centers in the last 12 months?' (Reasons for visiting: pre-post

HIV/AIDS test counselling, information on HIV/AIDS window period, HIV/AIDS test result, counselling on using condom correctly in each sexual intercourse). In addition to reasons above, discussion on safe injecting behaviour was also one of the self-reported reasons among PWID for visiting HTC. The independent variables (demographic, behavioural, psychosocial and structural risk variables) selected in this study have been described in web-only box 1.

Analysis and statistics

Data analysis was done separately for FSW and MSM/TG. Data was analysed using STATA (version 12.1 STATA Corp., College Station, TX, USA).Categorical variables were described using frequency and proportions. The unadjusted and adjusted analysis was performed separately for FSW and MSM/TG to assess the association of factors with the outcome variable (not utilising HTC in last one year). All the RDS-related descriptive output were adjusted to represent the structure of the study population (MSM/TG) which was based on information regarding who recruited whom, and the relative size of the respondent's network using the Volz–Heckathorn estimator (RDS II) (20).To assess the network size among MSM/TG, the following question was asked: "How many other MSM/TG do you know who also know you well? (Knowing someone is defined as being able to contact them and having had to contact with them in the past 12 months)." RDS-adjusted values presented in web-only table 1. Convergence plot for outcome variable is shown in web-only figure 1.Adjustment for clustering of two-stage cluster sampling was not required in FSW data as it was a self-weighted sample.

Bivariate associations between each independent variable and non-utilization of HTC were calculated using variance inflation factor after assessment for multicollinearity. Variables with a p-value of <0.2 in the bivariate analysis were included in the regression model (enter method). Adjusted prevalence ratios (aPR)with 95% confidence intervals

(CI)were calculated by fitting a Poisson regression with robust variance estimates. The variables included in multivariate model (adjusted prevalence ratio)for FSWwere age group, educational status, condom use at last sex, ever inject drugs, ever participated in HIV awareness program,physical assault in last year, forced sex in last year, having dependents, police detention in last 6 months, stigma towards HIV and distress/depression.The variables included in adjusted prevalence ratio for MSM/TG were an age group, condom use at last sex, drinking alcohol, ever participated in HIV awareness programme, physical assault in last year, forced sex in last year, and discrimination in job and suicidal thought 'ever'.

Initially, we used the log-binomial model to assess the association between independent and outcome variable of interest. However, the log-binomial model fails to converge. To overcome the effects of failed convergence, we have used the Poisson regression with robust variance estimates as recommended by the Tyler et al.[26].Poisson regression with robust variance can be used as an alternative of logistic regression and also provides accurate estimates in the cross-sectional study with binary outcome of interest[27]. We have calculated the prevalence ratio because it is easy to interpret than the odds ratio. We also assessed associations between outcome and independent variables via Poisson model using individualised RDS weights (web-only table 3).

Ethical Considerations

Ethics approval for IBBS survey 2012 was given by the Nepal Health Research Council (NHRC), Kathmandu, Nepal. Approval for the analysis of secondary data for this study was taken in 2016 from Ethics Advisory Group, the International Union Against Tuberculosis and Lung Disease (The Union), Paris, France. Administrative approval was also received from NCASC and Public Health and Environment Research Center (PERC) Nepal.

Waiver of informed consent was sought and approved by the ethics committee as this study involved analysis of secondary data.

RESULTS

IBBS survey 2012 included 610 FSW with the response rate among FSW was 88.9%. The non-responders were replaced by the randomly selected another FSW of the same cluster. The HIV prevalence was 1 percent among FSW. The proportion of FSW in the age group 16 to 19 was 13.9%. The prevalence of non-utilization of HTC in last one year was 54% among FSW. More than half FSW (59%) were married, 24% of them were divorced or separated. Two-third (68%) of FSW were literate (Table 1 and web-only table 2).

IBBS survey 2012 included 400 MSM/TG, and we did not record non-response among MSM/TG because of nature of sampling technique, i.e., study participants enrol the other possible participants in the study. The HIV prevalence was 3.3 percent among MSM/TG. The proportion of MSM/TG in the age group 16 to 19 was 17.2%. Non-utilization of HTC in last one year was 55% for MSM/TG. The majority of the MSM/TG were unmarried (72%) whereas very few of them were illiterate (3%).Other characteristics of the FSW and MSM/TG are presented in web-only tables 1 and 2.

The factors associated with non-utilisation of HTC in last one year among FSW and MSM/TG are summarised in **Table 1** and **Table 2** respectively. In multivariable analysis, the association between non-utilisation of HTC and distress/depression remained significant. FSW experiencing distress (APR: 1.4, 95% CI: 1.1–1.5) and depression(APR: 1.4, 95% CI: 1.1–1.6) were more likely to non-utilization of HTC in the past year. Similarly FSW who were injecting drugs (ever)(APR: 1.4, 95% CI: 1.1–1.8), ever participated in HIV awareness programmes (APR: 1.2, 95% CI: 1.0–1.4), or no dependents in the family (APR: 1.1, 95% CI: 1.0–1.3) were more likely to non-utilization of HTC. FSW who experienced forced sex (APR:

1.1, 95% CI: 1.0–1.3) in the last 12 months were also more likely to non-utilization of HTC (Table 1). episode

MSM/TG who were adolescents aged 16-19 years (APR: 1.4, 95% CI: 1.1–1.7) and experienced physical assault (APR: 1.8, 95% CI: 1.0–3.1) were more likely to non-utilization of HTC. However, MSM/TG who experienced forced sex (APR: 0.5, 95% CI: 0.3–0.9) were less likely to non-utilization of HTC. MSM/TG who did not use condom during their last sex (APR: 1.2, 95% CI: 1.0–1.4) or participated in HIV awareness programs (APR: 1.6, 95% CI: 1.3–2.0) were more likely to non-utilization of HTC (Table 2).

Table 1. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among female sex workers surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		Total N	HTC not Utilised[@] n(%)	Adj PR**
Total		**610**	**330(54)**	
Demographic				
Age in years	16-19	85	51 (60)	1.0 (0.8-1.2)
	20-24	130	73(56)	1.0 (0.7-1.2)
	>25	395	206 (52)	Ref.
Educational Status	Illiterate	196	98 (50)	0.9(0.7-1.0)
	Literate	414	232 (56)	Ref.
Marital Status	Married	360	197 (55)	Ref
	Unmarried	102	60 (59)	-
	Separated/ Divorced	148	73 (49)	-
Having dependents	Yes	341	169 (50)	Ref.
	No	269	161 (60)	1.1(1.0-1.3)*
Behavioural				
Condom use at last sex	Yes	461	256(56)	Ref.
	No	149	74(32)	0.9(0.7-1.0)
Ever inject drugs	Yes	40	29(73)	1.4(1.1-1.8)*
	No	570	301(53)	Ref.
Structural				
Ever participated in HIV awareness programs	Yes	169	102(52)	1.2(1.0-1.4)*
	No	441	228(60)	Ref.
Physical assault in last year	Yes	81	36 (44)	0.8 (0.6-1.0)
	No	529	294 (56)	Ref.
Housing Instability	Homeless	15	6 (40)	-
	Own home	320	169 (53)	-

	Rented	275	155 (56)	
Forced sex in last year	Yes	125	84 (67)	1.1(1.0-1.3)*
	No	485	246 (51)	Ref.
Police detention in last 6 months	Yes	81	37 (46)	0.8(0.6-1.0)
	No	529	293 (55)	Ref.
Client refusal to pay in last year	Yes	153	89 (58)	-
	No	457	241 (53)	-
Psychosocial				
Stigma towards HIV	Yes	295	168(57)	1.0(0.9-1.2)
	No	315	162(51)	Ref.
Suicidal thoughts (Ever)	Yes	210	117(56)	-
	No	399	212 (53)	-
Depression[#]	Euthymic	342	159 (46)	Ref.
	Distressed	156	100 (64)	1.4(1.1-1.5)*
	Depressed	112	71 (63)	1.4(1.1-1.6)*
SSQS^	Satisfied	530	289(55)	-
	Dissatisfied	80	41(51)	-

[@]Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity checked; [#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

Table 2. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among Men having Sex with Men/Transgender surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		**N**	**HTC not Utilised[@] n(%)[¥]**	**Adj PR****
Total		**400**	**221(55)**	
Demographic factors				
Age in years	16-19	69	54(78)	1.4(1.1-1.7)*
	20-24	129	73(57)	1.1(0.9-1.4)
	>25	202	94(47)	Ref
Educational Status	Illiterate	13	7(54)	-
	Literate	387	214(55)	-
Marital Status	Unmarried	289	163(56)	-
	Married	111	58(52)	-
Behavioural				
Condom use at last sex	Yes	339	177(72)	Ref.
	No	61	44(52)	1.2(1.0-1.4)*
Drinking Alcohol	Yes	323	186(58)	1.2(0.9-1.5)
	No	77	35(45)	Ref.
Structural				
Ever Participated in HIV awareness programs	Yes	185	62(34)	1.6(1.3-2.0)*
	No	215	159(74)	Ref.
Physical assault in last year	Yes	57	10(18)	1.8(1.0-3.1)*
	No	343	211(62)	Ref.
Housing instability	Homeless	8	4(50)	-
	Own home	75	42(56)	-
	Rented	317	175(55)	-
Forced sex in last year	Yes	52	10(19)	0.5(0.3-0.9)*
	No	348	211(61)	Ref.

Discrimination in Job	Yes	79	17(22)	Ref.
	No	321	204(64)	1.3(0.8-2.2)
Psychosocial factors				
Stigma towards HIV	Yes	253	138(54)	-
	No	147	83(56)	-
Suicidal thought Ever	Yes	107	33(31)	0.7(0.5-1.0)
	No	293	188(64)	Ref.
Depression[#]	Euthymic	220	121(59)	-
	Distressed	83	49(53)	-
	Depressed	97	51(55)	-
SSQS^	Satisfied	390	216(55)	-
	Dissatisfied	10	5(50)	-

¥Unweighted descriptive statistics. For RDS-weighted estimates refer to web-only table 3; @Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in model and collinearity checked;[#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

DISCUSSION

In IBBS 2012 survey, in addition to individual level variables, psychosocial and structural factors were added. To the best of our knowledge, this study is the first to explore the relation of psychosocial and structural factors with HTC non-utilization among FSW and MSM/TG in Nepal. The uptake of HTC was low (around 55%) among MSM/ TG in Nepal which is consistent with the findings of studies conducted in Assam and Andra Pradesh India, Zhejiang province China and Bangkok Thailand[28–31].Our study also demonstrates a low level of uptake of HTC among PWID in Nepal which is even lower (33%) among PWID of Manipur and Nagaland in India[32]. The current scenario suggests that the low uptake of HTC among MSM/TG and PWID not only challenge the timely identification and linking them to treatment to improve their health but also increase the risk of secondary transmission from HIV-infected MSM/TG and PWID to their partners. Community-based HTC with different approaches (mobile testing and door-to-door testing etc.) that found effective in increasing uptake of HTC and linking them to HIV care among MSM/TG and PWID in other settings[33] need to be evaluated in the context of Nepal. Otherwise, the 90-90-90 targets prioritised to improve health and prevention of secondary HIV transmission would not be

possible in Nepal. This study also found different risk factors for non-utilization of HTC in last one year among FSW and MSM/TG.They were demographic: late adolescents (MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG), forced sex in last one year (risk factor among FSW and protective factor among MSM/TG), absence of dependent members (FSW), physical assault in last year (MSM/TG); and psychosocial: being distressed/depressed (FSW).

Psychosocial factors play an important role in health services utilisation [16]. FSW who had distress or depression (four out of every 10) had a higher prevalence of non-utilization of HTC. This could have resulted in disempowerment and thereby resulting in not accessing HTC services when needed[13,14].Studies have found that FSW used alcohol and drugs, to reduce stress and to help them cope with their work[17,34].Gambian study showed that women who experienced forced sex reported severe depression[35].A study conducted among FSW working outside of the capital city (Kathmandu) found a very high prevalence of depression, and the experience of any form violence (verbal, physical and sexual) was also common among them and also associated with depression[36].Currently, there are no targeted programs that address the mental health problems of FSW in Nepal and lack of laws that protect the rights of sex workers also exacerbating the experience of violence among them. Efforts addressing the experience of violence and its consequences (depression) among FSW are essential in Nepal otherwise it would be difficult to increase uptake of HTC among them.

According to the IBBS survey report of 2012, old MSM/TG were found to use condoms more when compared to younger ones. Similarly, the median age of first sexual intercourse being16 years and the fact that the old adolescents (16-19 years) MSM/TG did not significantly access HTC is a cause of concern[10,13]. The risk-taking behaviour in adolescents can compound their risk in acquiring HIV, and hence this group need to be

targeted. In Nepal, the blanket approach to implementing interventions (HTC) without considering the specific needs of adolescents or young people belonging to key populations might have effects in low uptake of HTC among them. Evidence from China suggests that the use of peer-led community-based rapid HIV test increase the uptake of HIV testing among young MSM[37].

Not visiting an HTC facility was also associated with not using a condom during last sex among MSM/TG. FSW who were injecting drugs were also less likely to uptake HTC in the last 12 months. Our study findings are consistent with the study conducted among FSW in Vietnam where unprotected sex and injecting drug use associated with less likely to have voluntary HIV test [38]. The findings suggest that we are missing to reach those FSW who were at increased risk for HIV due to their risky dual behaviours such as unprotected sex or injecting drug abuse.

Some factors affecting utilisation of HTC by MSM/TG were different from that of FSW. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs among FSW. Among MSM/TG, the experience of forced sex led to the utilisation of HTC. The difference might be due to the fact that MSM/TG are highly networked population than the FSW[39]such as most of them are directly and indirectly associated with their community organisations (Blue Diamond Society) which work for the rights of gender and sexuality minorities in Nepal. That may have resulted to seek available services among MSM/TG after experiencing the sexual abuse.

Participation in HIV awareness programmes by key population showed decreasing trend over the years [10,13]. Participation as a risk factor for non-utilisation of HTC for both FSW and MSM/TG seemed intriguing. The activities which enlisted more participation were short duration events like condom/AIDS day celebration compared to effective training methods like demonstration classes, workshops,etc.**(web-only table 2)**. These aforementioned

short-term awareness activities might not affect knowledge level of FSW and MSM/TG about the importance of HTC. The other explanation for this could be the cross-sectional nature of data. Those who had visited an HTC in last one year might not have felt the need for attending HIV awareness programmes.

Despite being limited by a cross-sectional design, the findings of this study bring out three significant policy implications. First, the intervention to address the burden of depression needs to be an integral part of programmes for FSW and MSM/TG at all levels. Second, HTC should be developed as an empowerment centre or training to improve their skills that help FSW and MSM/TG to tackle physical and sexual abuse. Third, specific prevention programmes should be rolled out to reach adolescent FSW and MSM/TG, and FSW who were practising dual risk behaviours such as inconsistent condom use or injecting drug use. The HTC centre should also consider the specific needs of adolescent FSW or MSM/TG.

Our study adhered to STROBE guidelines for conduct and report of the study [40]. The findings are generalizable to FSW, and MSM/TG of Nepal as standard sampling strategy was followed for the IBBS survey [10,13–15]. The present study had inherent limitations of analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in last 12 months among MSM/TG) could not be included in the analysis due to missing data. The limitations of the original survey like social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables. The cross-sectional design itself could result in difficulties in ascertaining temporality between various factors studied and non-utilization of HTC.

CONCLUSION

To conclude, the psychosocial and structural factors are influencing utilisation of HIV testing and counselling centres among FSW and MSM/TG in Nepal. In addition to focussing on these risk factors, there is a need to improve HTC to lend psychosocial support or to address the need of specific adolescent FSW and MSM/TG or FSW who also inject drugs. Creative behaviour change and communication strategies or interventions to improve skills to tackle physical and sexual abuse should be ensured to overcome the limitations of current programmes for key populations in Nepal.

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Licence statement

Figure Legend

Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal.

Figure footnote

**MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs (we did not analyse PWID data), FSW – female sex workers; KTM valley- Kathmandu Valley*

Web-only figure 1. Convergence plot for the outcome of interest.

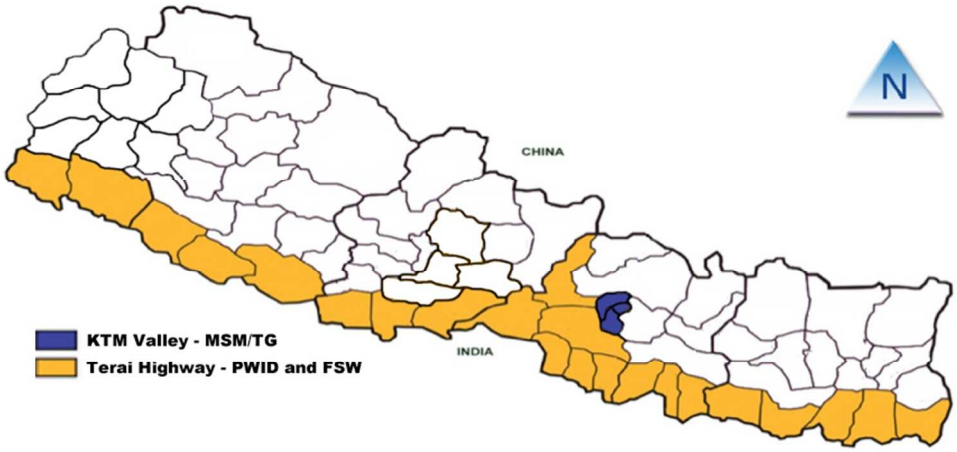
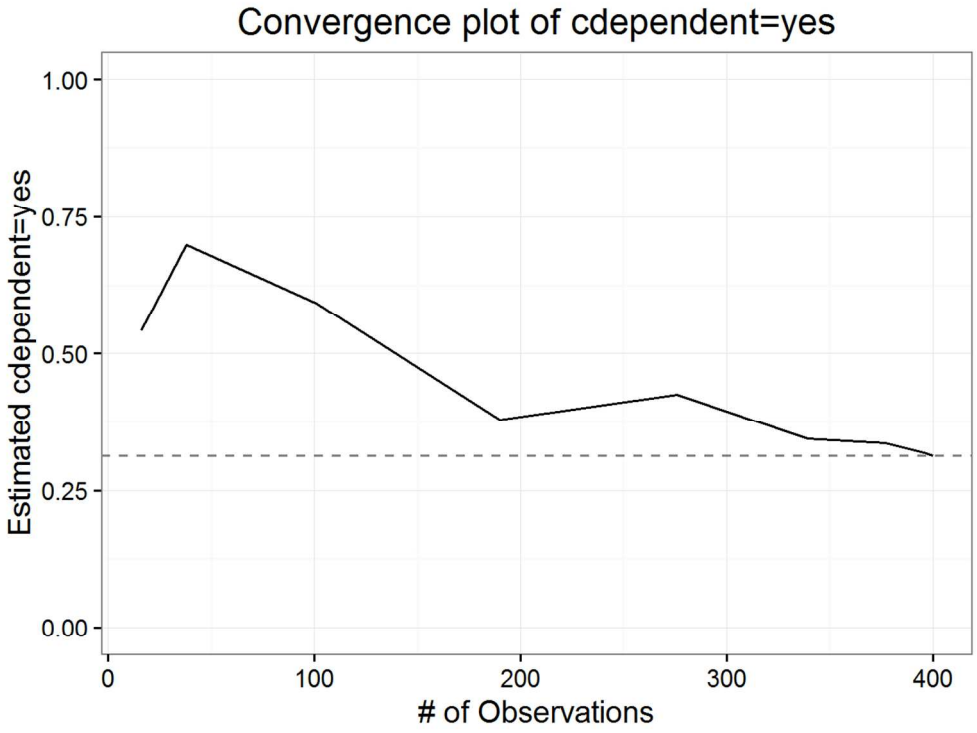


Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal. Figure footnote *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers



Web-only table 1.The prevalence of demographic, psychosocial and structural factors among MSM/TG, IBBS 2012 Nepal.

Factors		MSM/TG* Frequency (%)	MSM/TG RDS Adjusted (CI)
Total		400 (100)	
	HIV prevalence		3.3 (1.9-5.9)
	HTC not utilized	221(55)	68.6 (54.3-80.1)
Demographic			
	Age in years		
	16-19	69 (17)	17.7(11.5-26.1)
	20-24	129 (32)	31.3(22.5-41.8)
	≥25	202 (51)	51.0(39.2-62.5)
	Illiterate	13(3)	3.1(1.2-7.9)
	Married	111(28)	23.3(16.2-32.2)
Behavioural			
	Condom use in last sex	339(85)	75.8(64.8-84.2)
	Drinking Alcohol	323(81)	81.0(71.3-88.1)
Structural			
	Ever Participated in HIV awareness programs	185(46)	35.6(23.9-49.2)
	Physical assault in last year	57(14)	6.3(3.6-10.8)
	Housing instability		
	Own Home	75(19)	19.9(12.4-30.3)
	Forced sex in last year	52(13)	5.5(3.3-9.1)
	Discrimination in Job	79(20)	5.9(3.9-8.8)
Psychosocial			
	Stigma	253(63)	63.2(52.0-73.2)
	Suicidal thought	107(27)	14.2(9.8-20.1)
	Depression		
	Distressed	83(21)	14.9(10.3-21.1)
	Depressed	97(24)	18.2(11.9-26.7)
	SSQS^		
	Satisfied	390(97)	98.5(96.1-99.4)
	Dissatisfied	10(3)	1.5(0.5-3.8)
Number of seed		8	
Maximum no. of recruitment wave (mean)		8 (3.67)	

*MSM/TG – Men who have sex with men/transgender, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

Web-only table 2. The prevalence of demographic, psychosocial and structural factors among FSW, IBBS 2012 Nepal.

Factors		FSW N (%)
Total		610 (100)
HIV prevalence		6 (1)
Demographic		
	Age in years	
	16-19	85 (14)
	20-24	130 (21)
	≥25	395(65)
	Illiterate	196(32)
	Married	360(59)
Behavioural		
	Use of condom with most recent client	461(75)
	Consistent condom use	236(59)
Structural		
	Having dependents in family	341(56)
	Own home	311(51)
	Forced sex in last one year	125(21)
	Knowledge regarding confidential HTC	397(65)
	Participated in discussion in HIV	84(29)
	Participated in HIV awareness program	169(28)
	Participated in AIDS day	238(39)
	Participated in Condom Day	207(34)
	Participated in Workshop for HIV	110(18)
	Received demonstration on Condon Use	61(10)
	Comprehensive Knowledge on condom	122(20)
Psychosocial		
	Stigma	295(48)
	Suicidal thought	210(34)
	Distressed / Depressed	268 (44)
	SSQS^	
	Satisfied	530(87)
	Dissatisfied	80(3)

*MSM/TG – Men who have sex with men/transgender, FSW – female sex workers, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

Web-only table 3. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among Men having Sex with Men/Transgender using RDS weights

Variables		N	HTC not Utilised[@] n(%)[¥]	Adj PR**
Total		**400**	**221(55)**	
Demographic factors				
Age in years	16-19	69	54(78)	1.3(1.0-1.7)*
	20-24	129	73(57)	1.1(0.8-1.4)
	>25	202	94(47)	Ref
Educational Status	Illiterate	13	7(54)	-
	Literate	387	214(55)	-
Marital Status	Unmarried	289	163(56)	-
	Married	111	58(52)	-
Behavioural				
Condom use at last sex	Yes	339	177(72)	Ref.
	No	61	44(52)	1.2(1.1-1.4)*
Drinking Alcohol	Yes	323	186(58)	1.1(0.9-1.3)
	No	77	35(45)	Ref.
Structural				
Ever Participated in HIV awareness programs	Yes	185	62(34)	2.2(1.3-3.7)*
	No	215	159(74)	Ref.
Physical assault in last year	Yes	57	10(18)	1.2(.8-1.7)
	No	343	211(62)	Ref.
Housing instability	Homeless	8	4(50)	-
	Own home	75	42(56)	-
	Rented	317	175(55)	-
Forced sex in last year	Yes	52	10(19)	0.5(0.2-1.1)***
	No	348	211(61)	Ref.
Discrimination in Job	Yes	79	17(22)	Ref.
	No	321	204(64)	0.9(0.6-1.5)
Psychosocial factors				
Stigma towards HIV	Yes	253	138(54)	-
	No	147	83(56)	-
Suicidal thought Ever	Yes	107	33(31)	0.8(0.6-1.3)
	No	293	188(64)	Ref.
Depression[#]	Euthymic	220	121(59)	-
	Distressed	83	49(53)	-
	Depressed	97	51(55)	-
SSQS^	Satisfied	390	216(55)	-
	Dissatisfied	10	5(50)	-

¥Unweighted descriptive statistics.For RDS-weighted estimates refer to web-only table 2; @Not utilised in last one year; * p<0.05; ***p=0.07 **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in model and collinearity checked;[#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

Web-only box 1. Independent variables used in this study from the IBBS 2012survey among FSW and MSM/TG to determine Uptake of HTC, Nepal.

Demographic Factors: Age, Educational Status, Marital Status, Having dependent

Behavioural Factors: Condom Use last sex, Ever inject drug, Drinking alcohol

Psychosocial Factors:

- ✓ Among FSW: Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)
- ✓ Among MSM/TG:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)

Structural Factors:

- ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever participated in HIV programs, Police detention in last 6 months, Physical assault last year, Client refusal to pay after sex in last year
- ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical assault last year, Experienced forced sex in last year, Discrimination in Job

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Current paper
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Done. In abstract. Line 26
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Done. Line 23-44
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Done. Line 64-94
Objectives	3	State specific objectives, including any pre-specified hypotheses	Done. Line 95-97. There was no pre-specified hypothesis. We wanted to explore the risk factors for non-utilization of HIV testing centre.
Methods			
Study design	4	Present key elements of study design early in the paper	Done. Line 109-111
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Done. Line 112-138
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Done. Line 157-172

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Done. Line 110-111 and 157-171. Comparability described in lines 183-190.
Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
Study size	10	Explain how the study size was arrived at	Line 139-156
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Done. Line 173-190.
		(*b*) Describe any methods used to examine subgroups and interactions	Lines 183-190.
		(*c*) Explain how missing data were addressed	Not applicable.
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	Lines 178-182
		(*e*) Describe any sensitivity analyses	Not applicable.

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Line 203-204
		(b) Give reasons for non-participation at each stage	Not applicable
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Done. Line 204-207
		(b) Indicate number of participants with missing data for each variable of interest	No missing data
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Done. 205-206
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Lines 209-214
		(*b*) Report category boundaries when continuous variables were categorized	Lines 162-166
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	Done. Line 239-248
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Done. Line 300-306
Interpretation	20	Give a cautious overall interpretation of	Done. Line 309-312

		results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	Done. Line 299-300
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Done. Line 315-333

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Why don't key populations access HIV testing and counselling centres in Nepal? Findings based on national surveillance survey

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Why don't key populations access HIV testing and counselling centres in Nepal? Findings based on national surveillance survey

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Keywords: Key populations; HIV voluntary testing and counselling; MSM; Transgender; FSW; SORT IT; Nepal

ABSTRACT

Objectives: To assess the demographic, behavioural, psychosocial and structural factors associated with non-utilization of HIV testing and counselling centres (HTC) by female sex workers (FSW) and men who have sex with men/ transgender (MSM/TG).

Methods: This study involved a cross-sectional design. We used the national surveillance survey data of 2012 which included 610 FSW and400 MSM/TG recruited randomly from 22 and three districts of Nepal respectively. Adjusted prevalence ratio (aPR) and 0.95 confidence interval (CI) using modified Poisson regression was used to assess and infer the association between outcome (non-utilization of HTC in last year) and independent variables.

Results: Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG. The significant factors for non-utilization of HTC among FSW were: depression [aPR=1.4(1.1-1.6)], injectable drug abuse (ever) [aPR=1.4(1.1-1.8)], participation (ever) in HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in previous year [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1(1.0-1.3)]. Non-utilisation of HTC among MSM/TG had significant association with age 16-19 years [aPR=1.4(1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4), participation (ever) in HIV awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-3.1)], experience of forced sex in previous year [aPR=0.5(0.3-0.9)]

Conclusion: Although limited by cross-sectional design, we found many programmatically relevant findings. Creative strategies should be envisaged for effective behavioural change communication to improve access to HIV testing. Psychosocial and structural interventions should be integrated with HIV prevention programmes to support key populations in accessing HIV testing.

Summary – strengths and limitations of this study

1. Psychosocial and structural factors were assessed for the first time in the national surveillance survey of 2012.

2. Social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables.

3. The cross-sectional design of study limits to conclude causality.

INTRODUCTION

Globally, at the end of 2015, an estimated 36.7 million people were living with HIV of which 47% did not know their HIV status and hence were deprived of antiretroviral therapy and care[1]. According to UNAIDS 90-90-90 target, by 2020, 90% of all individuals living with HIV should know their HIV status, 90% of all individuals with diagnosed HIV infection should receive sustained antiretroviral therapy, and 90% of all individuals receiving antiretroviral therapy should have viral suppression. By 2030 the AIDS epidemic will come to an end as public health threat if these three targets are achieved[2].

The key population are those who have a high risk of acquiring or transmitting HIV. Global studies have shown that key populations are 13 to 22 times more likely to be infected with HIV than the general population[3]. Key population includes female sex workers (FSW) and men who have sex with men (MSM)/ transgender (TG)[4]. FSW and MSM/TGare13-14 times more likely to be infected with HIV than the general population[3].

World Health Organization (WHO) recommended integrated biological and behavioural surveillance (IBBS) survey to monitor HIV prevalence and risk behaviours among key populations. In the late 90s, IBBS was started by Government of Nepal as part of response plan against HIV/AIDS epidemic[5]. HIV testing and counselling (HTC) is the entry point for HIV care services in Nepal and are provided free of cost to all.HTC is a critical intervention in achieving the first 90, i.e., people living with HIV should know their HIV status. Though the first step is crucial in identifying people living with HIV, the retention in care of PLHIV in second 90 and third 90 is equally necessary to maximise the treatment and prevention benefits of antiretroviral therapy[6,7]. National consolidated guidelines for preventing and treating HIV in Nepal had recommended various approaches for maximising HIV testing in both facility and community-based settings[4,5]. Different surveillance surveys

conducted in Nepal found that the non-utilization of HTC was low, i.e., around 50%in FSW and MSM/TG[8].

There was a substantial decline in the proportion of FSW visiting HTC in 2016 compared to 2012 as revealed by IBBS 2016 [9]. Among FSW, decreasing trend in HIV prevalence was accompanied by an increasing trend in lack of comprehensive knowledge regarding HIV [9,10]. The UNAIDS target of 90% assessment of HIV status by 2020 might not be reached in Nepal unless factors associated with non-utilization of HTC are identified and addressed [2,11,12].

Psychosocial variables like distress/ depression were included only in IBBS 2012 survey and were found to be high(40-50 percent) of the key population (people who inject drugs, FSW and MSM/TG) studied[10,13,14].Different studies demonstrate that the psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of HIV-related risk behaviours among FSW and MSM/TG in Nepal [15,16]. Studies conducted outside of Nepal (India and USA) among key populations (MSM/TG and FSW) found that the psychosocial (depression, substance abuse, violence) and structural factors not only increase their risk behaviours but also lowers the uptake of behavioural interventions.[17–19]. The identification of effects of psychosocial and structural factors in the uptake of HTC would help us to improve existing challenges of reaching key populations in Nepal. However such evidence is very limited in Nepal. Therefore using the IBBS 2012 data, we aimed to determine the demographic, behavioural, psychosocial and structural risk factors associated with non-utilization of HTC in last one-year by FSW and MSM/TG in Nepal.

METHODS

Study design

This study was a cross-sectional study involving secondary data of FSW and MSM/TG collected from IBBS survey of 2012 in Nepal.

Setting

Nepal, with a population of 27 million, is a low-middle income, a beautiful landlocked country in South-East Asia[20]. It shares borders with China in the north and India to the south, east and west. Nepal is divided into 75 districts and consists of a Himalayan mountainous region in the north and open terrain (*Terai* in local language) in the south. HTC service was first started in Nepal in 1995 by the National Programme for AIDS and Sexually Transmitted Disease. There are over 235 HTC service sites in Nepal as of July 2016.

HTC in Nepal

In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to identify people living with HIV and link them to treatment. It is voluntary and provided free of cost. Health facilitators should maintain confidentiality and obtain informed consent during pre and post-test counselling. According to national guidelines, key populations are expected to visit HTC in every 6-12 months[5]. Besides that, community-based interventions are also prioritised in which peer educators and outreach workers are mobilised in the community. Peer educators are volunteers who convey crucial information (proper condom use, HIV testing, etc.) to key populations in informal (cruising areas like bus park or public park) and formal setting (drop-in centres). They also distribute condoms, safe needles/ syringes or aware them about available treatment, care and support services.

IBBS 2012 Survey, Nepal

National Centre for AIDS and STD Control (NCASC), Nepal, conducted two separate cross-sectional IBBS surveys between September and November 2012 for FSW and MSM/TG respectively. FSW were defined as "*women aged 16 years and above reporting to have been paid in cash or kind for sex with a male within the last six months*." MSM/TG were defined as *"men aged 16 years or above who have had sexual relations (either oral or anal) with another male in the 12 months preceding the survey*."(7). A survey among FSW was conducted in 22 *Terai* highway districts and for MSM/TG in three districts of Kathmandu valley (Kathmandu, Lalitpur and Bhaktapur) **(figure 1).**

Study population and sampling

The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of clusters, and stage 2 was the random selection of an equal number of participants from each selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30 sex workers in that area; those with fewer than 30 sex workers were merged with nearby locations to form a cluster. To identify clusters, mapping was performed with the support of local non-governmental organisations to determine areas where sex work is common and noting the estimated number of possible survey participants in each area. Seventy clusters out of a total of 401 clusters were selected based on probability proportionate to size (PPS).

The MSM were recruited using respondent driven sampling (RDS) in three districts of Kathmandu valley. To begin with, a total of eight MSM/TG were recruited as seed. Those seeds were informed about survey protocols and procedure and were encouraged to recruit other eligible individuals from their social networks randomly to participate in the survey. These initial seeds were provided three coupons to pass to their peers who are eligible to participate in the survey.

Detailed methodology and sampling strategies for IBBS surveys have been described previously [10,13–15].

Data variables for the present study

IBBS survey included information on behavioural factors like uptake of interventions for HIV, demographic, behavioural, psychosocial and structural variables[10,13,14]. Structural factors included environmental/context conditions which were outside the control of the individual, but which could influence his/her perceptions, behaviour and health [21]. Psychosocial variables (social support and depression) were assessed using social support questionnaire short form (SSQS) and centre for epidemiological studies depression (CES-D) scale respectively. The CES-D tool showed high reliability and validity in assessing depression in diverse groups such as PLHIV, women and MSM with Cronbach's alpha ≥.85 and comparative fit indices more than 0.90[22]. The CES-D is extensively normed and validated tool[23]. Similarly the reliability and construct validity of scale SSQS reported high (>0.90) by different studies [24,25].

Median score of <5 in SSQS scale was interpreted as 'dissatisfied with available social support'. CES-D scale more than 16-21 and ≥22 were to classify distress and depression respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of demographic, behavioural, psychosocial and structural factors have been summarised in **web-only tables 1 and 2**.

A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was chosen as the outcome variable. The outcome variable assessed by asking 'Have you visited (Yes vs. No) any HTC centers in the last 12 months?' (Reasons for visiting: pre-post

HIV/AIDS test counselling, information on HIV/AIDS window period, HIV/AIDS test result, counselling on using condom correctly in each sexual intercourse). In addition to reasons above, discussion on safe injecting behaviour was also one of the self-reported reasons among PWID for visiting HTC. The independent variables (demographic, behavioural, psychosocial and structural risk variables) selected in this study have been described in web-only box 1.

Analysis and statistics

Data analysis was done separately for FSW and MSM/TG. Data was analysed using STATA (version 12.1 STATA Corp., College Station, TX, USA).Categorical variables were described using frequency and proportions. The unadjusted and adjusted analysis was performed separately for FSW and MSM/TG to assess the association of factors with the outcome variable (not utilising HTC in last one year). All the RDS-related descriptive output were adjusted to represent the structure of the study population (MSM/TG) which was based on information regarding who recruited whom, and the relative size of the respondent's network using the Volz–Heckathorn estimator (RDS II) (20).To assess the network size among MSM/TG, the following question was asked: "How many other MSM/TG do you know who also know you well? (Knowing someone is defined as being able to contact them and having had to contact with them in the past 12 months)." RDS-adjusted values presented in web-only table 1. Convergence plot for outcome variable is shown in web-only figure 1.Adjustment for clustering of two-stage cluster sampling was not required in FSW data as it was a self-weighted sample.

Bivariate associations between each independent variable and non-utilization of HTC were calculated using variance inflation factor after assessment for multicollinearity. Variables with a p-value of <0.2 in the bivariate analysis were included in the regression model (enter method). Adjusted prevalence ratios (aPR)with 95% confidence intervals

(CI)were calculated by fitting a Poisson regression with robust variance estimates.The variables included in multivariate model (adjusted prevalence ratio)for FSWwere age group, educational status, condom use at last sex, ever inject drugs, ever participated in HIV awareness program,physical assault in last year, forced sex in last year, having dependents, police detention in last 6 months, stigma towards HIV and distress/depression.The variables included in adjusted prevalence ratio for MSM/TG were an age group, condom use at last sex, drinking alcohol, ever participated in HIV awareness programme, physical assault in last year, forced sex in last year, and discrimination in job and suicidal thought 'ever'.

Initially, we used the log-binomial model to assess the association between independent and outcome variable of interest. However, the log-binomial model fails to converge. To overcome the effects of failed convergence, we have used the Poisson regression with robust variance estimates as recommended by the Tyler et al.[26].Poisson regression with robust variance can be used as an alternative of logistic regression and also provides accurate estimates in the cross-sectional study with binary outcome of interest[27]. We have calculated the prevalence ratio because it is easy to interpret than the odds ratio. We also assessed associations between outcome and independent variables via Poisson model using individualised RDS weights (web-only table 3).

Ethical Considerations

Ethics approval for IBBS survey 2012 was given by the Nepal Health Research Council (NHRC), Kathmandu, Nepal. Approval for the analysis of secondary data for this study was taken in 2016 from Ethics Advisory Group, the International UnionAgainst Tuberculosis and Lung Disease (The Union), Paris, France. Administrative approval was also received from NCASC and Public Health and Environment Research Center (PERC) Nepal.

Waiver of informed consent was sought and approved by the ethics committee as this study involved analysis of secondary data.

RESULTS

IBBS survey 2012 included 610 FSW with the response rate among FSW was 88.9%. The non-responders were replaced by the randomly selected another FSW of the same cluster. The HIV prevalence was 1 percent among FSW. The proportion of FSW in the age group 16 to 19 was 13.9%. The prevalence of non-utilization of HTC in last one year was 54% among FSW. More than half FSW(59%) were married, 24% of them were divorced or separated. Two-third (68%) of FSW were literate (Table 1 and web-only table 2).

IBBS survey 2012 included 400 MSM/TG, and we did not record non-response among MSM/TG because of nature of sampling technique, i.e., study participants enrol the other possible participants in the study. The HIV prevalence was 3.3 percent among MSM/TG. The proportion of MSM/TG in the age group 16 to 19 was 17.2%. Non-utilization of HTC in last one year was 55% for MSM/TG.The majority of the MSM/TG were unmarried (72%) whereas very few of them were illiterate (3%).Other characteristics of the FSW and MSM/TG are presented in web-only tables 1 and 2.

The factors associated with non-utilisation of HTC in last one year among FSW and MSM/TG are summarised in **Table 1** and **Table 2** respectively. In multivariable analysis, the association between non-utilisation of HTC and distress/depression remained significant. FSW experiencing distress (APR: 1.4, 95% CI: 1.1–1.5) and depression(APR: 1.4, 95% CI: 1.1–1.6) were more likely to non-utilization of HTC in the past year. Similarly FSW who were injecting drugs (ever)(APR: 1.4, 95% CI: 1.1–1.8), ever participated in HIV awareness programmes (APR: 1.2, 95% CI: 1.0–1.4), or no dependents in the family (APR: 1.1, 95% CI: 1.0–1.3) were more likely to non-utilization of HTC. FSW who experienced forced sex (APR:

1.1, 95% CI: 1.0–1.3) in the last 12 months were also more likely to non-utilization of HTC (Table 1). episode

MSM/TG who were adolescents aged 16-19 years(APR: 1.4, 95% CI: 1.1–1.7) and experienced physical assault(APR: 1.8, 95% CI: 1.0–3.1) were more likely to non-utilization of HTC. However, MSM/TG who experienced forced sex(APR: 0.5, 95% CI: 0.3–0.9) were less likely to non-utilization of HTC. MSM/TG who did not use condom during their last sex (APR: 1.2, 95% CI: 1.0–1.4) or participated in HIV awareness programs (APR: 1.6, 95% CI: 1.3–2.0) were more likely to non-utilization of HTC (Table 2).

We also assessed the association between independent variables and outcome variable via Poisson model using individualised RDS weights. But not much variation was observed in the results of the weighted and unweighted analysis (web-only table 3).

Table 1. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among female sex workers surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		Total N	HTC not Utilised[@] n(%)	Adj PR**
Total		**610**	**330(54)**	
Demographic				
Age in years	16-19	85	51 (60)	1.0 (0.8-1.2)
	20-24	130	73(56)	1.0 (0.7-1.2)
	>25	395	206 (52)	Ref.
Educational Status	Illiterate	196	98 (50)	0.9(0.7-1.0)
	Literate	414	232 (56)	Ref.
Marital Status	Married	360	197 (55)	Ref
	Unmarried	102	60 (59)	-
	Separated/ Divorced	148	73 (49)	-
Having dependents	Yes	341	169 (50)	Ref.
	No	269	161 (60)	1.1(1.0-1.3)*
Behavioural				
Condom use at last sex	Yes	461	256(56)	Ref.
	No	149	74(32)	0.9(0.7-1.0)
Ever inject drugs	Yes	40	29(73)	1.4(1.1-1.8)*
	No	570	301(53)	Ref.
Structural				
Ever participated in HIV awareness	Yes	169	102(52)	1.2(1.0-1.4)*

programs	No	441	228(60)	Ref.
Physical assault in last year	Yes	81	36 (44)	0.8 (0.6-1.0)
	No	529	294 (56)	Ref.
Housing Instability	Homeless	15	6 (40)	-
	Own home	320	169 (53)	-
	Rented	275	155 (56)	
Forced sex in last year	Yes	125	84 (67)	1.1(1.0-1.3)*
	No	485	246 (51)	Ref.
Police detention in last 6 months	Yes	81	37 (46)	0.8(0.6-1.0)
	No	529	293 (55)	Ref.
Client refusal to pay in last year	Yes	153	89 (58)	-
	No	457	241 (53)	-
Psychosocial				
Stigma towards HIV	Yes	295	168(57)	1.0(0.9-1.2)
	No	315	162(51)	Ref.
Suicidal thoughts (Ever)	Yes	210	117(56)	-
	No	399	212 (53)	-
Depression[#]	Euthymic	342	159 (46)	Ref.
	Distressed	156	100 (64)	1.4(1.1-1.5)*
	Depressed	112	71 (63)	1.4(1.1-1.6)*
SSQS^	Satisfied	530	289(55)	-
	Dissatisfied	80	41(51)	-

[@]Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity checked; [#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

Table 2. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among Men having Sex with Men/Transgender surveyed under Integrated Biological and Behavioural Surveillance Survey, 2012, Nepal

Variables		**N**	**HTC not Utilised[@] n(%)[¥]**	**Adj PR****
Total		**400**	**221(55)**	
Demographic factors				
Age in years	16-19	69	54(78)	1.4(1.1-1.7)*
	20-24	129	73(57)	1.1(0.9-1.4)
	>25	202	94(47)	Ref
Educational Status	Illiterate	13	7(54)	-
	Literate	387	214(55)	-
Marital Status	Unmarried	289	163(56)	-
	Married	111	58(52)	-
Behavioural				
Condom use at last sex	Yes	339	177(72)	Ref.
	No	61	44(52)	1.2(1.0-1.4)*
Drinking Alcohol	Yes	323	186(58)	1.2(0.9-1.5)
	No	77	35(45)	Ref.
Structural				
Ever Participated in HIV awareness	Yes	185	62(34)	1.6(1.3-2.0)*
programs	No	215	159(74)	Ref.
Physical assault in last year	Yes	57	10(18)	1.8(1.0-3.1)*
	No	343	211(62)	Ref.

Housing instability	Homeless	8	4(50)	-
	Own home	75	42(56)	-
	Rented	317	175(55)	-
Forced sex in last year	Yes	52	10(19)	0.5(0.3-0.9)*
	No	348	211(61)	Ref.
Discrimination in Job	Yes	79	17(22)	Ref.
	No	321	204(64)	1.3(0.8-2.2)
Psychosocial factors				
Stigma towards HIV	Yes	253	138(54)	-
	No	147	83(56)	-
Suicidal thought Ever	Yes	107	33(31)	0.7(0.5-1.0)
	No	293	188(64)	Ref.
Depression[#]	Euthymic	220	121(59)	-
	Distressed	83	49(53)	-
	Depressed	97	51(55)	-
SSQS^	Satisfied	390	216(55)	-
	Dissatisfied	10	5(50)	-

¥Unweighted descriptive statistics. For RDS-weighted estimates refer to web-only table 3; @Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in model and collinearity checked;[#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

DISCUSSION

In IBBS 2012 survey, in addition to individual level variables, psychosocial and structural factors were added. To the best of our knowledge, this study is the first to explore the relation of psychosocial and structural factors with HTC non-utilization among FSW and MSM/TG in Nepal. The uptake of HTC was low (around 55%) among MSM/ TG in Nepal which is consistent with the findings of studies conducted in Assam and Andra Pradesh India, Zhejiang province China and Bangkok Thailand[28–31].Our study also demonstrates a low level of uptake of HTC among PWID in Nepal which is even lower (33%) among PWID of Manipur and Nagaland in India[32]. The current scenario suggests that the low uptake of HTC among MSM/TG and PWID not only challenge the timely identification and linking them to treatment to improve their health but also increase the risk of secondary transmission from HIV-infected MSM/TG and PWID to their partners. Community-based HTC with different approaches (mobile testing and door-to-door testing etc.) that found effective in increasing uptake of HTC and linking them to HIV care among MSM/TG and PWID in other

settings[33] need to be evaluated in the context of Nepal. Otherwise, the 90-90-90 targets prioritised to improve health and prevention of secondary HIV transmission would not be possible in Nepal. This study also found different risk factors for non-utilization of HTC in last one year among FSW and MSM/TG.They were demographic: late adolescents (MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG), forced sex in last one year (risk factor among FSW and protective factor among MSM/TG), absence of dependent members (FSW), physical assault in last year (MSM/TG); and psychosocial: being distressed/depressed (FSW).

Psychosocial factors play an important role in health services utilisation [16]. FSW who had distress or depression (four out of every 10) had a higher prevalence of non-utilization of HTC. This could have resulted in disempowerment and thereby resulting in not accessing HTC services when needed[13,14].Studies have found that FSW used alcohol and drugs, to reduce stress and to help them cope with their work[17,34].Gambian study showed that women who experienced forced sex reported severe depression[35].A study conducted among FSW working outside of the capital city (Kathmandu) found a very high prevalence of depression, and the experience of any form violence (verbal, physical and sexual) was also common among them and also associated with depression[36].Currently, there are no targeted programs that address the mental health problems of FSW in Nepal and lack of laws that protect the rights of sex workers also exacerbating the experience of violence among them. Efforts addressing the experience of violence and its consequences (depression) among FSW are essential in Nepal otherwise it would be difficult to increase uptake of HTC among them.

According to the IBBS survey report of 2012, old MSM/TG were found to use condoms more when compared to younger ones. Similarly, the median age of first sexual intercourse being16 years and the fact that the old adolescents (16-19 years) MSM/TG did not

significantly access HTC is a cause of concern[10,13]. The risk-taking behaviour in adolescents can compound their risk in acquiring HIV, and hence this group need to be targeted. In Nepal, the blanket approach to implementing interventions (HTC) without considering the specific needs of adolescents or young people belonging to key populations might have effects in low uptake of HTC among them. Evidence from China suggests that the use of peer-led community-based rapid HIV test increase the uptake of HIV testing among young MSM[37].

Not visiting an HTC facility was also associated with not using a condom during last sex among MSM/TG. FSW who were injecting drugs were also less likely to uptake HTC in the last 12 months. Our study findings are consistent with the study conducted among FSW in Vietnam where unprotected sex and injecting drug use associated with less likely to have voluntary HIV test [38]. The findings suggest that we are missing to reach those FSW who were at increased risk for HIV due to their risky dual behaviours such as unprotected sex or injecting drug abuse.

Some factors affecting utilisation of HTC by MSM/TG were different from that of FSW. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs among FSW. Among MSM/TG, the experience of forced sex led to the utilisation of HTC. The difference might be due to the fact that MSM/TG are highly networked population than the FSW[39]such as most of them are directly and indirectly associated with their community organisations (Blue Diamond Society) which work for the rights of gender and sexuality minorities in Nepal. That may have resulted to seek available services among MSM/TG after experiencing the sexual abuse.

Participation in HIV awareness programmes by key population showed decreasing trend over the years [10,13]. Participation as a risk factor for non-utilisation of HTC for both FSW and MSM/TG seemed intriguing. The activities which enlisted more participation were

short duration events like condom/AIDS day celebration compared to effective training methods like demonstration classes, workshops,etc.**(web-only table 2)**. These aforementioned short-term awareness activities might not affect knowledge level of FSW and MSM/TG about the importance of HTC. The other explanation for this could be the cross-sectional nature of data. Those who had visited an HTC in last one year might not have felt the need for attending HIV awareness programmes.

Despite being limited by a cross-sectional design, the findings of this study bring out three significant policy implications. First, the intervention to address the burden of depression needs to be an integral part of programmes for FSW and MSM/TG at all levels. Second, HTC should be developed as an empowerment centre or training to improve their skills that help FSW and MSM/TG to tackle physical and sexual abuse. Third, specific prevention programmes should be rolled out to reach adolescent FSW and MSM/TG, and FSW who were practising dual risk behaviours such as inconsistent condom use or injecting drug use. The HTC centre should also consider the specific needs of adolescent FSW or MSM/TG.

Our study adhered to STROBE guidelines for conduct and report of the study [40]. The findings are generalizable to FSW, and MSM/TG of Nepal as standard sampling strategy was followed for the IBBS survey [10,13–15]. The present study had inherent limitations of analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in last 12 months among MSM/TG) could not be included in the analysis due to missing data. The limitations of the original survey like social desirability bias, recall bias due to the assessment of past exposures might have influenced the self-reported variables. The cross-sectional design itself could result in difficulties in ascertaining temporality between various factors studied and non-utilization of HTC.

CONCLUSION

To conclude, the psychosocial and structural factors are influencing the utilisation of HIV testing and counselling centres among FSW and MSM/TG in Nepal. In addition to focussing on these risk factors, there is a need to improve HTC to lend psychosocial support or to address the need of specific adolescent FSW and MSM/TG or FSW who also inject drugs. Creative behaviour change and communication strategies or interventions to improve skills to tackle physical and sexual abuse should be ensured to overcome the limitations of current programmes for key populations in Nepal.

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Licence statement

Figure Legend

Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal.

Figure footnote

**MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs (we did not analyse PWID data), FSW – female sex workers; KTM valley- Kathmandu Valley*

Web-only figure 1. Convergence plot for the outcome of interest.

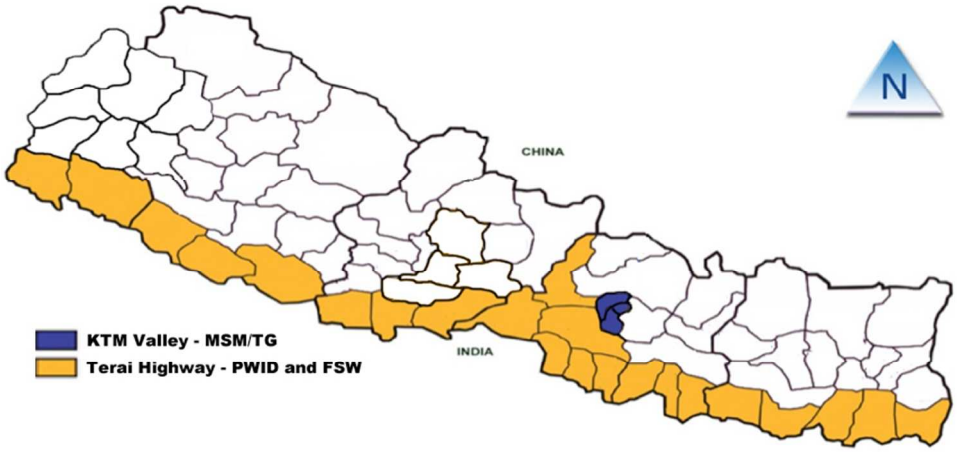
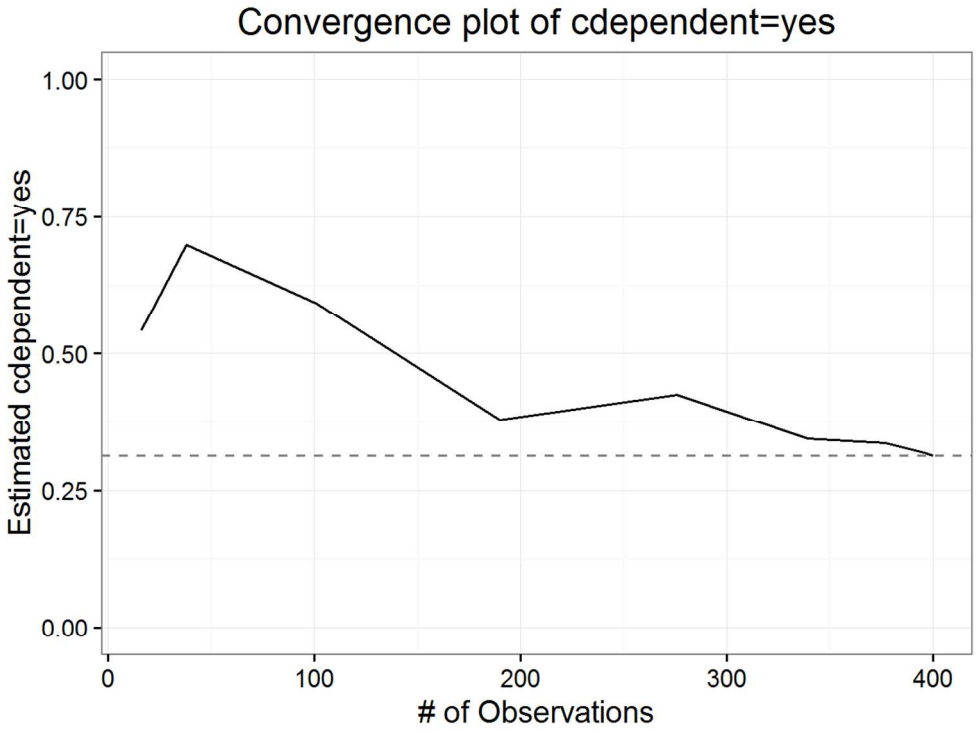


Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal. Figure footnote *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers



Web-only table 1.The prevalence of demographic, psychosocial and structural factors among MSM/TG, IBBS 2012 Nepal.

Factors		MSM/TG* Frequency (%)	MSM/TG RDS Adjusted (CI)
Total		400 (100)	
	HIV prevalence		3.3 (1.9-5.9)
	HTC not utilized	221(55)	68.6 (54.3-80.1)
Demographic			
	Age in years		
	16-19	69 (17)	17.7(11.5-26.1)
	20-24	129 (32)	31.3(22.5-41.8)
	≥25	202 (51)	51.0(39.2-62.5)
	Illiterate	13(3)	3.1(1.2-7.9)
	Married	111(28)	23.3(16.2-32.2)
Behavioural			
	Condom use in last sex	339(85)	75.8(64.8-84.2)
	Drinking Alcohol	323(81)	81.0(71.3-88.1)
Structural			
	Ever Participated in HIV awareness programs	185(46)	35.6(23.9-49.2)
	Physical assault in last year	57(14)	6.3(3.6-10.8)
	Housing instability		
	Own Home	75(19)	19.9(12.4-30.3)
	Forced sex in last year	52(13)	5.5(3.3-9.1)
	Discrimination in Job	79(20)	5.9(3.9-8.8)
Psychosocial			
	Stigma	253(63)	63.2(52.0-73.2)
	Suicidal thought	107(27)	14.2(9.8-20.1)
	Depression		
	Distressed	83(21)	14.9(10.3-21.1)
	Depressed	97(24)	18.2(11.9-26.7)
	SSQS^		
	Satisfied	390(97)	98.5(96.1-99.4)
	Dissatisfied	10(3)	1.5(0.5-3.8)
Number of seed		8	
Maximum no. of recruitment wave (mean)		8 (3.67)	

*MSM/TG – Men who have sex with men/transgender, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

Web-only table 2. The prevalence of demographic, psychosocial and structural factors among FSW, IBBS 2012 Nepal.

Factors		FSW N (%)
Total		610 (100)
HIV prevalence		6 (1)
Demographic		
	Age in years	
	16-19	85 (14)
	20-24	130 (21)
	≥25	395(65)
	Illiterate	196(32)
	Married	360(59)
Behavioural		
	Use of condom with most recent client	461(75)
	Consistent condom use	236(59)
Structural		
	Having dependents in family	341(56)
	Own home	311(51)
	Forced sex in last one year	125(21)
	Knowledge regarding confidential HTC	397(65)
	Participated in discussion in HIV	84(29)
	Participated in HIV awareness program	169(28)
	Participated in AIDS day	238(39)
	Participated in Condom Day	207(34)
	Participated in Workshop for HIV	110(18)
	Received demonstration on Condon Use	61(10)
	Comprehensive Knowledge on condom	122(20)
Psychosocial		
	Stigma	295(48)
	Suicidal thought	210(34)
	Distressed / Depressed	268 (44)
	SSQS^	
	Satisfied	530(87)
	Dissatisfied	80(3)

*MSM/TG – Men who have sex with men/transgender, FSW – female sex workers, HIV- Human Immunodeficiency Virus., AIDS- Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support Questionnaire Score.

Web-only table 3. Factors associated with non-utilization of HIV Testing and Counselling (HTC) centres among Men having Sex with Men/Transgender using RDS weights

Variables		N	HTC not Utilised[@] n(%)[¥]	Adj PR**
Total		**400**	**221(55)**	
Demographic factors				
Age in years	16-19	69	54(78)	1.3(1.0-1.7)*
	20-24	129	73(57)	1.1(0.8-1.4)
	>25	202	94(47)	Ref
Educational Status	Illiterate	13	7(54)	-
	Literate	387	214(55)	-
Marital Status	Unmarried	289	163(56)	-
	Married	111	58(52)	-
Behavioural				
Condom use at last sex	Yes	339	177(72)	Ref.
	No	61	44(52)	1.2(1.1-1.4)*
Drinking Alcohol	Yes	323	186(58)	1.1(0.9-1.3)
	No	77	35(45)	Ref.
Structural				
Ever Participated in HIV awareness programs	Yes	185	62(34)	2.2(1.3-3.7)*
	No	215	159(74)	Ref.
Physical assault in last year	Yes	57	10(18)	1.2(.8-1.7)
	No	343	211(62)	Ref.
Housing instability	Homeless	8	4(50)	-
	Own home	75	42(56)	-
	Rented	317	175(55)	-
Forced sex in last year	Yes	52	10(19)	0.5(0.2-1.1)***
	No	348	211(61)	Ref.
Discrimination in Job	Yes	79	17(22)	Ref.
	No	321	204(64)	0.9(0.6-1.5)
Psychosocial factors				
Stigma towards HIV	Yes	253	138(54)	-
	No	147	83(56)	-
Suicidal thought Ever	Yes	107	33(31)	0.8(0.6-1.3)
	No	293	188(64)	Ref.
Depression[#]	Euthymic	220	121(59)	-
	Distressed	83	49(53)	-
	Depressed	97	51(55)	-
SSQS^	Satisfied	390	216(55)	-
	Dissatisfied	10	5(50)	-

¥Unweighted descriptive statistics.For RDS-weighted estimates refer to web-only table 2; @Not utilised in last one year; * p<0.05; ***p=0.07 **Adjusted prevalence ratio using Poisson regression with robust variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in model and collinearity checked;[#]Depression measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.

Web-only box 1. Independent variables used in this study from the IBBS 2012survey among FSW and MSM/TG to determine Uptake of HTC, Nepal.

Demographic Factors: Age, Educational Status, Marital Status, Having dependent

Behavioural Factors: Condom Use last sex, Ever inject drug, Drinking alcohol

Psychosocial Factors:

- ✓ Among FSW: Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)
- ✓ Among MSM/TG:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social Support Questionnaire Score (SSQS)

Structural Factors:

- ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever participated in HIV programs, Police detention in last 6 months, Physical assault last year, Client refusal to pay after sex in last year
- ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical assault last year, Experienced forced sex in last year, Discrimination in Job

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Current paper
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Done. In abstract. Line 26
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Done. Line 23-44
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Done. Line 64-94
Objectives	3	State specific objectives, including any pre-specified hypotheses	Done. Line 95-97. There was no pre-specified hypothesis. We wanted to explore the risk factors for non-utilization of HIV testing centre.
Methods			
Study design	4	Present key elements of study design early in the paper	Done. Line 109-111
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Done. Line 112-138
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Done. Line 157-172

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Done. Line 110-111 and 157-171. Comparability described in lines 183-190.
Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
Study size	10	Explain how the study size was arrived at	Line 139-156
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Done. Line 173-190.
		(*b*) Describe any methods used to examine subgroups and interactions	Lines 183-190.
		(*c*) Explain how missing data were addressed	Not applicable.
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	Lines 178-182
		(*e*) Describe any sensitivity analyses	Not applicable.

Continued on next page

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Line 203-204
		(b) Give reasons for non-participation at each stage	Not applicable
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Done. Line 204-207
		(b) Indicate number of participants with missing data for each variable of interest	No missing data
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Done. 205-206
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Lines 209-214
		(*b*) Report category boundaries when continuous variables were categorized	Lines 162-166
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	Done. Line 239-248
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Done. Line 300-306
Interpretation	20	Give a cautious overall interpretation of	Done. Line 309-312

		results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	Done. Line 299-300
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Done. Line 315-333

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.