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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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3 1 **Why don't key populations access HIV counselling and testing centers in**
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5 2 **Nepal? Findings based on national surveillance survey**
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37 14 **Running title:** IBBS 2012Nepal: factors for non-utilization of HTC
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3 22 **ABSTRACT**
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6 23 **Objectives:** To assess the demographic, behavioural, structural and psychosocial factors
7
8 24 associated with non-utilization of HIV testing and counselling centers (HTC) by female sex
9
10 25 workers (FSWs) and men who have sex with men/ transgender (MSM/TGs).
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12
13 26 **Methods:** This study involved a cross-sectional design. We used the national surveillance
14
15 27 survey data of 2012 which included 610 FSW and 400 MSM/TG recruited randomly from 22
16
17 28 and 3 districts of Nepal respectively. Adjusted prevalence ratio (aPR) and 0.95 CI using
18
19 29 modified Poisson regression was used to assess and infer the association between independent
20
21 30 and outcome (non-utilization of HTC in last year) variables.
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24 31 **Results:** Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG.
25
26 32 The significant factors for non-utilization of HTC among FSW were: depression [aPR=1.4
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28 33 (1.1-1.6)], injectable drug abuse (ever) [aPR=1.4 (1.1-1.8)], participation (ever) in HIV
29
30 34 awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in previous year
31
32 35 [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1 (1.0-1.3)]. Non-
33
34 36 utilisation of HTC among MSM/TG had significant association with age 16-19 years
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36 37 [aPR=1.4 (1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4)], participation (ever) in HIV
37
38 38 awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-
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40 39 3.1)], experience of forced sex in previous year [aPR=0.5 (0.3-0.9)]
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44 40 **Conclusion:** Although limited by cross-sectional design, we found many programmatically
45
46 41 relevant findings. Creative strategies should be envisaged for effective behavioural change
47
48 42 communication to improve access to HIV testing. Psychosocial and structural interventions
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50 43 should be integrated with HIV prevention programmes to support key populations in
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52 44 accessing HIV testing.
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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.

63 INTRODUCTION

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

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

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

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

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

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3 87 prevalence was accompanied by an increasing trend in lack of comprehensive knowledge
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5 88 regarding HIV and the downward trend of carrying a condom consistently [7,8]. The
6
7 89 UNAIDS target of 90% assessment of HIV status by 2020 might not be reached in Nepal
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10 90 unless factors associated with non-utilization of HTC are identified and addressed [2,9,10].
11
12 91 Psychosocial variables like distress/severe depression were included only in IBBS 2012
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14 92 survey and were found to be over 50 percent of the key population (FSW and MSM/TG)
15
16 93 studied [8,11,12]. Psychosocial problems (depression, drug abuse and suicidality) increase the
17
18 94 likelihood of HIV-related risk behaviours among FSW and MSM/TG [13,14].
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21 95 Therefore using the IBBS 2012 data, we aimed to determine the demographic,
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23 96 behavioural, structural and psychosocial risk factors associated with non-utilization of HTC
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25 97 services in last one year by FSW and MSM/TG in Nepal.
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3 108 **METHODS**
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6 109 **Study design**
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9 110 This study was a cross-sectional study involving secondary data of FSW and MSM/TG
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11 111 collected from IBBS survey of 2012 in Nepal.
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14 112 **Setting**
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17 113 Nepal, with a population of 27 million, is a low-middle income, land-locked country
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19 114 in South-East Asia [15]. It shares borders with China in the north and India to the south, east
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21 115 and west. Nepal is divided into 75 districts and consists of Himalayan mountainous region in
22
23 116 the north and open terrain (*Terai* in local language) in the south. HTC service was first started
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25 117 in Nepal in 1995 by the National programme for AIDS and sexually transmitted disease.
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27 118 There are over 235 HTC service sites in Nepal as of July 2016.
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30 119 *HTC in Nepal*
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33 120 In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to
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35 121 identify people living with HIV and link them to treatment. It is voluntary and provided free
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37 122 of cost. Health facilitators should maintain confidentiality and obtain informed consent during
38
39 123 pre and post-test counselling. According to national guidelines, key populations are expected
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41 124 to visit HTC in every 6-12 months [6]. Besides that, community-based interventions are also
42
43 125 prioritised in which peer educators and outreach workers are mobilized in the community.
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45 126 Peer educators, trained by outreach workers, are volunteers who convey crucial information
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47 127 (proper condom use, HIV testing, etc.) to key populations in informal (cruising areas like bus
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49 128 park or public park) and formal setting (drop-in centers) through HIV awareness programmes,
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51 129 AIDS days, condom days, workshops/discussion on HIV, demonstration on condom use etc.
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56 130 *IBBS 2012 Survey, Nepal*
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3 131 National Centre for AIDS and STD control (NCASC), Nepal, conducted two separate
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5 132 cross-sectional IBBS studies between September and November 2012 for FSW and MSM/TG
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7 133 respectively. FSWs were defined as “*women aged 16 years and above reporting to have been*
8
9 134 *paid in cash or kind for sex with a male within the last six months.*” MSM/TG were defined as
10
11 135 “*those males aged 16 years or above who have had sexual relations (either oral or anal) with*
12
13 136 *another male in the 12 months preceding the survey.*”(7). A survey among FSW was
14
15 137 conducted in 22 *Terai* highway districts and for MSM/TG in three districts of Kathmandu
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17 138 valley (figure 1).

21 139 **Study population and sampling**

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24 140 The FSW were recruited using two-stage cluster sampling; stage 1 was the selection
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26 141 of clusters and stage 2 was the random selection of an equal number of participants from each
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28 142 selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30
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30 143 sex workers in that area; those with fewer than 30 sex workers were merged with nearby
31
32 144 locations to form a cluster. To identify clusters, mapping was performed in collaboration with
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34 145 service providers from local non-governmental organizations and community leaders to
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36 146 determine areas where sex work is common, and noting the estimated number of possible
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38 147 survey participants in each area. Seventy clusters out of a total of 401 clusters were selected
39
40 148 based on probability proportionate to size (PPS).

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45 149 The MSM were recruited using respondent driven sampling (RDS) in consultation
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47 150 with relevant stakeholder and motivators. To begin with, a total of eight MSM/TG were
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49 151 recruited as seed. Those seeds were informed about survey protocols and procedure and were
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51 152 encouraged to recruit other eligible individuals from their social networks randomly to
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53 153 participate in survey. These initial seeds were provided three coupons to pass to their peers
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55 154 who are eligible to participate in survey.

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3 155 Detailed methodology and sampling strategies for IBBS surveys have been described
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5 156 previously [8,11–13].
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8 157 **Data variables for the present study**

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11 158 IBBS survey included information on behavioural factors like uptake of interventions
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13 159 for HIV, demographic, behavioural, structural and psychosocial variables [8,11,12]. Structural
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15 160 factors included environmental/context conditions which were outside the control of the
16
17 161 individual, but which could influence his/her perceptions, behaviour and health [16].
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19 162 Psychosocial variables (social support and depression) were assessed using social support
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21 163 questionnaire short form (SSQS) and centre for epidemiological studies depression (CES-D)
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23 164 scale respectively. Median score of <5 in SSQS scale was interpreted as ‘dissatisfied with
24
25 165 social support’. CES-D scale more than 16 and 22 were to classify distress and depression
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27 166 respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of
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29 167 demographic, behavioural, structural and psychosocial factors have been summarized in **web-**
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31 168 **only table 1.**
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36 169 A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was
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38 170 chosen as the outcome variable. The independent variables (demographic, behavioural,
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40 171 structural and psychosocial risk variables) selected in this study have been described in web-
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42 172 only box 1.
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46 173 **Analysis and statistics**

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49 174 Data analysis was done separately for FSW and MSM/TG. Data was analysed using
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51 175 STATA (version 12.1 STATA Corp., College Station, TX, USA). Categorical variables were
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53 176 described using frequency and proportions. The unadjusted and adjusted analysis was
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55 177 performed separately for FSW and MSM/TG to assess the association of factors with the
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57 178 outcome (not utilising HTC in last one year). All the RDS-related descriptive output were
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3 179 adjusted to represent the structure of the study population (MSM/TG) which was based on
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5 180 information regarding who recruited whom, and the relative size of the respondent's network
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7 181 using the Volz–Heckathorn estimator (RDS II) (20). Adjustment for clustering was not
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10 182 required in FSW data as it was a self-weighted sample.

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12 183 Variables with a p-value of <0.2 in the unadjusted analysis were included in the
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14 184 regression model (enter method) after assessment for multicollinearity using variance
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16 185 inflation factor. The variables included for FSW were age group, educational status, condom
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18 186 use in last sex, 'ever' participated in HIV program, distress/depression and suicidal thought
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21 187 'ever'. For MSM/TG, the variables included were educational status, condom use in last sex,
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23 188 'ever' participated in HIV program, distress/depression and suicidal thought 'ever'. Adjusted
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25 189 prevalence ratios (aPR) with 95% confidence intervals (CI) were calculated by fitting Poisson
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27 190 regression with robust variance estimates.

29 191 **Ethical Considerations**

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32 192 Ethics approval for IBBS survey 2012 was given by the Nepal Health Research
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34 193 Council (NHRC), Kathmandu, Nepal. Ethics approval for the analysis of secondary data for
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36 194 this study was taken in 2016 from Ethics Advisory Group, the International Union Against
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38 195 Tuberculosis and Lung Disease (The Union), Paris, France. Administrative approval was also
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40 196 received from NCASC and Public Health and Environment Research Center (PERC) Nepal.
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43 197 Waiver of informed consent was sought and approved by the ethics committee as this study
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45 198 involved analysis of secondary data.

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3 202 **RESULTS**
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6 203 IBBS survey 2012 included 610 FSW and 400 MSM/TG with HIV prevalence of 1
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8 204 and 3.8 percent respectively. The proportion of FSW and MSM/TG in the age group 16 to 19
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10 205 was 13.9% and 17.2% respectively. Non-utilization of HTC in last one year was 54% for
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12 206 FSW and 55% for MSM/TG. Other characteristics of the study population are presented in
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14
15 207 web-only table 1. The factors associated with non-utilisation of HTC in last one year among
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17 208 FSW and MSM/TG are summarised in **Table 1** and **Table 2** respectively.
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20 209 The risk factors for non-utilisation of HTC in last one year among FSW were: injection of
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22 210 drugs (ever), participation (ever) in HIV awareness programmes, an episode of forced sex in
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24 211 last one year, the absence of dependents in the family and distress/depression.
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28 212 The risk factors for non-utilisation of HTC in last one year among FSW were: young age (16-
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30 213 19 years), no condom use in last sex, participation (ever) in HIV awareness programs,
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32 214 physical assault in last year and not having forced sex in last year.
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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.

229 **Table 2.** Factors associated with non-utilization of HIV Testing and Counselling (HTC)
 230 centers among Men having Sex with Men/Transgender surveyed under Integrated Biological
 231 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)	-

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

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3 238 **DISCUSSION**
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6 239 In IBBS 2012 survey, in addition to individual level variables, psychosocial and
7
8 240 structural factors were added. To the best of our knowledge, this study is the first to explore
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10 241 the relation of psychosocial and structural factors with HTC non-utilization among FSW and
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12 242 MSM/TG in Nepal. This study found different risk factors for non-utilization of HTC in last
13
14 243 one year among FSW and MSM/TG. They were demographic: late adolescents (MSM/TG);
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16 244 behavioural: injectable drug abuse (FSW) and no condom use at last sex (MSM/TG);
17
18 245 structural: participation in HIV awareness programmes (FSW and MSM/TG), forced sex in
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20 246 last one year (risk factor among FSW and protective factor among MSM/TG), absence of
21
22 247 dependent members (FSW), physical assault in last year (MSM/TG); and psychosocial: being
23
24 248 distressed/depressed (FSW).
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28 249 Psychosocial factors play an important role in health services utilisation [14]. FSWs
29
30 250 who had distress or depression (one in two FSWs) had a higher prevalence of non-utilization
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32 251 of HTC. This could have resulted in disempowerment and thereby resulting in not accessing
33
34 252 HTC services when needed [11,12]. Studies have found that FSWs used alcohol and drugs, to
35
36 253 reduce stress and to help them cope with their work [17,18]. Gambian study showed that
37
38 254 women who experienced forced sex reported severe depression [19].
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42 255 Old MSM/TGs were found to use condoms more when compared to younger ones.
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44 256 The median age of first sexual intercourse being 16 years and the fact that the old adolescents
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46 257 (16-19 years) MSM/TGs did not significantly access HTC is a cause of concern [8,11]. The
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48 258 risk-taking behaviour in adolescence can compound their risk in acquiring HIV, and hence
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50 259 this group need to be targeted.
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53 260 Not visiting an HTC facility was also associated with not using a condom during last
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55 261 sex among MSM/TGs. Injectable drug abuse and not having dependent members among
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3 262 FSWs were associated with non-utilization of HTC. These high-risk groups deserve urgent
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5 263 attention.
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7 264 Some factors affecting utilisation of HTC by MSM/TGs were different from that of
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9 265 FSWs. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs
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11 266 among FSWs. Among MSM/TGs, the experience of forced sex led to utilisation of HTC.
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13 267 IBBS survey revealed that the perception of HIV risk by key population was related to
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15 268 condom use, which was higher among MSM/TGs when compared to FSWs. Three-fourths of
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17 269 MSM/TG believed they were at little or no risk of HIV if condoms were used [8]. This could
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19 270 explain the different effects forced sex experience had on HTC utilization among FSW and
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21 271 MSM/TGs.
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25 272 Participation in HIV awareness programmes by key population showed decreasing
26
27 273 trend over the years [8,11]. Participation as a risk factor for non-utilisation of HTC for both
28
29 274 FSW and MSM/TG seemed intriguing. In Nepal, the major component of a prevention
30
31 275 programme is awareness raising activities. Educators taught key population on modes of HIV
32
33 276 transmission, consistent and correct use of condoms and STI prevention. It is seen that
34
35 277 interaction with peer educators was higher in MSM/TGs compared to FSWs [8,11]. The
36
37 278 activities which enlisted more participation were short duration events like condom/AIDS day
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39 279 celebration compared to effective training methods like demonstration classes, workshops,
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41 280 etc. that provide a platform for deeper understanding of HIV risks (**web-only table 1**). HIV
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43 281 prevention programme seemed to revolve around the promotion of condom with peer
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45 282 educators and popular HIV/AIDS messages focusing on condom-related messages and
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47 283 activities. Hence participation in awareness classes resulted in high condom use and the fact
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49 284 that two-thirds of MSM/TGs and FSWs were tested for HIV at some point in time could have
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51 285 narrowed their risk perception to a low level as well as decreased their felt need to access
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53 286 HTC. The other explanation for this could be the cross-sectional nature of data. Those who
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3 287 had visited an HTC in last one year might not have felt the need for attending HIV awareness
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5 288 programmes.
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8 289 Despite being limited by a cross-sectional design, the findings of this study bring out
9
10 290 three major policy implications. First, psychosocial support needs to be an integral part of
11
12 291 programmes for FSW and MSM/TG at all levels. HTC should be developed as an
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14 292 empowerment centre lending psychosocial and treatment support rather than being a centre
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16 293 for testing alone. Second, HIV prevention programmes in Nepal need to go beyond condom
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18 294 promotion. Creative strategies should be envisaged for effective behavioural change
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20 295 communication. Third, specific prevention programmes should be rolled out to reach key
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22 296 population at specific risks considering contextual/demographic differentials between key
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24 297 populations, say for example young MSM/TGs.
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29 298 Our study adhered to STROBE guidelines for conduct and report of the study [20].
30
31 299 The findings are generalizable to FSWs and MSM/TGs of Nepal as standard sampling
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33 300 strategy was followed for the IBBS survey [8,11–13]. The present study had inherent
34
35 301 limitations of analysing secondary data. Certain pertinent variables (for example; injectable
36
37 302 drug abuse in last 12 months among MSM/TG) could not be included in the analysis due to
38
39 303 missing data. The limitations of the original survey like social desirability bias, recall bias
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41 304 due to the assessment of past exposures might have influenced the self-reported variables. The
42
43 305 cross-sectional design itself could result in difficulties in ascertaining temporality between
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45 306 various factors studied and non-utilization of HTC.
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51 52 53 308 **CONCLUSION**

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56 309 To conclude, the psychosocial and structural factors are influencing utilisation of HIV
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58 310 testing and counselling centers among FSW and MSM/TG in Nepal. In addition to focussing
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3 311 on these risk factors, there is a need to empower HTC's to lend psychosocial support to the key
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5 312 population. Creative behaviour change and communication strategies should be ensured to
6
7 313 overcome the limitations of current awareness programmes for key populations.
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10 314

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7 338
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10
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12
13 341 all authors were involved in critically reviewing the draft and approving the final draft for
14
15 342 submission.
16

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19
20 344 provided on request.
21

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32 349 **REFERENCES**
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38 420 **Figure Legend**

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40 421 **Figure 1.** Study districts included in Integrated Biological and Behavioural Surveillance
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42 422 (IBBS) survey 2012, Nepal.

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47 424 Figure footnote

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50 425 *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW
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52 426 – female sex workers

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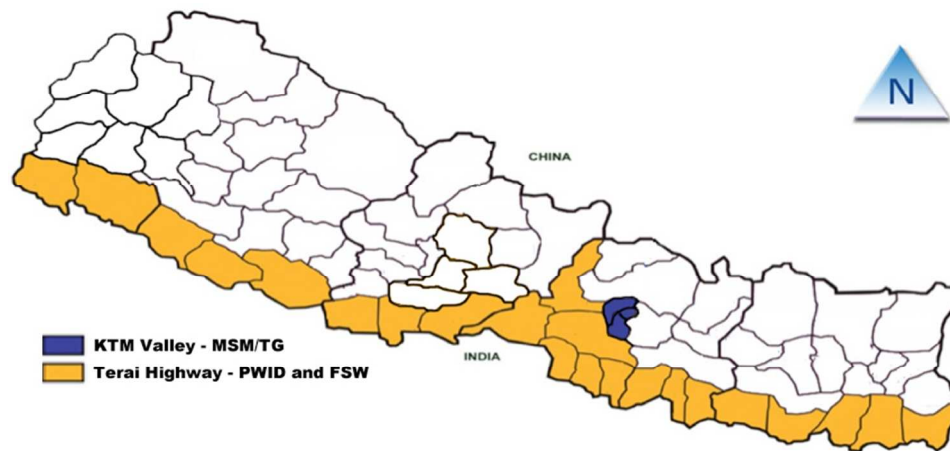


Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal.

Figure footnote

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

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3 Web-only box 1. Independent variables used in this study from the IBBS 2012 survey among
4 FSW and MSM/TG to determine Uptake of HTC, Nepal.
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8 **Demographic Factors:** Age, Educational Status, Marital Status
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10 **Behavioural Factors:** Condom Use last sex, Ever inject drug, Drinking alcohol
11

12 **Structural Factors:**
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- 14 ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever
15 participated in HIV programs, Having dependent, Police detention in last 6 months,
16 Physical assault last year, Client refusal to pay after sex in last year
17
- 18 ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical
19 assault last year, Experienced forced sex in last year, Discrimination in Job
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25 **Psychosocial Factors:**
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- 27 ✓ Among FSW:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social
28 Support Questionnaire Score (SSQS)
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- 30 ✓ Among MSM/TG:, Stigma towards HIV, Suicidal thoughts Ever, Depression, The
31 Social Support Questionnaire Score (SSQS)
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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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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

1 2 3 4 5 6 7	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.
8 9	Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
10	Study size	10	Explain how the study size was arrived at	Line 139-156
11 12 13 14 15	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34	Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	Done. Line 173-190. Lines 183-190. Not applicable. Lines 178-182
35			(e) Describe any sensitivity analyses	Not applicable.

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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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	
		<i>Cross-sectional study</i> —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

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2 results considering objectives, limitations,
3 multiplicity of analyses, results from similar
4 studies, and other relevant evidence

5 Generalisability 21 Discuss the generalisability (external Done. Line 299-300
6 validity) of the study results

7
8 **Other information**

9 Funding 22 Give the source of funding and the role of the Done. Line 315-333
10 funders for the present study and, if
11 applicable, for the original study on which
12 the present article is based

13
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15 *Give information separately for cases and controls in case-control studies and, if applicable, for exposed and
16 unexposed groups in cohort and cross-sectional studies.
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19 **Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and
20 published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely
21 available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at
22 <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is
23 available at www.strobe-statement.org.
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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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Primary Subject Heading:	Public health
Secondary Subject Heading:	HIV/AIDS, Public health
Keywords:	HTC, MSM/TG, FSW, Nepal

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3 1 **Why don't key populations access HIV testing and counselling centres in**
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6 2 **Nepal? Findings based on national surveillance survey**

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8
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16 **Running title:** IBBS 2012Nepal: factors for non-utilization of HTC

17 **Word count:** Abstract -246; Main text - 2577; Tables – 2; Figure – 1; Web-only table – 1;
18 Web-only box - 1

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

1
2
3 **ABSTRACT**
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6 **Objectives:** To assess the demographic, behavioural, psychosocial and structural factors
7
8 associated with non-utilization of HIV testing and counselling centres (HTC) by female sex
9
10 workers (FSW) and men who have sex with men/ transgender (MSM/TG).
11

12 **Methods:** This study involved a cross-sectional design. We used the national surveillance
13
14 survey data of 2012 which included 610 FSW and 400 MSM/TG recruited randomly from 22
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16 and three districts of Nepal respectively. Adjusted prevalence ratio (aPR) and 0.95 confidence
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18 interval (CI) using modified Poisson regression was used to assess and infer the association
19
20 between outcome (non-utilization of HTC in last year) and independent variables.
21
22

23 **Results:** Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG.
24

25
26 The significant factors for non-utilization of HTC among FSW were:
27
28 depression [aPR=1.4(1.1-1.6)], injectable drug abuse (ever) [aPR=1.4(1.1-1.8)], participation
29
30 (ever) in HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in
31
32 previous year [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1(1.0-1.3)].
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35 Non-utilisation of HTC among MSM/TG had significant association with age 16-19 years
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37 [aPR=1.4(1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4)], participation (ever) in HIV
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39 awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-
40
41 3.1)], experience of forced sex in previous year [aPR=0.5(0.3-0.9)]
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43

44 **Conclusion:** Although limited by cross-sectional design, we found many programmatically
45
46 relevant findings. Creative strategies should be envisaged for effective behavioural change
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48 communication to improve access to HIV testing. Psychosocial and structural interventions
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50 should be integrated with HIV prevention programmes to support key populations in
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52 accessing HIV testing.
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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.

64 INTRODUCTION

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

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

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

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3 88 surveillance surveys conducted in Nepal found that the non-utilization of HTC was low, i.e.,
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5 89 around 50%in FSW and MSM/TG[8].
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8 90 There was a substantial decline in the proportion of FSW visiting HTC in 2016
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10 91 compared to 2012 as revealed by IBBS 2016 [9]. Among FSW, decreasing trend in HIV
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12 92 prevalence was accompanied by an increasing trend in lack of comprehensive knowledge
13
14 93 regarding HIV [9,10]. The UNAIDS target of 90% assessment of HIV status by 2020 might
15
16 94 not be reached in Nepal unless factors associated with non-utilization of HTC are identified
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18 95 and addressed [2,11,12].
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22 96 Psychosocial variables like distress/ depression were included only in IBBS 2012
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24 97 survey and were found to be high(around 50 percent)of the key population(people who inject
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26 98 drugs, FSW and MSM/TG) studied[10,13,14].Different studies demonstrate that the
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28 99 psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of
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30 100 HIV-related risk behaviours amongFSW and MSM/TG in Nepal [15,16]. Studies conducted
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32 101 outside of Nepal (India and USA)among key populations (MSM and FSW) found that the
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34 102 psychosocial (depression, substance abuse, violence) and structural factors not only increase
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36 103 their risk behaviours but also lowers the uptake of behavioural interventions.[17–19]. The
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38 104 identification of effects of psychosocial and structural factors in the uptake of HTC would
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40 105 help us to improve existing challenges of reaching key populations in Nepal. However such
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42 106 evidence is very limited in Nepal. Therefore using the IBBS 2012 data, we aimed to
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44 107 determine the demographic, behavioural, psychosocial and structural risk factors associated
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46 108 with non-utilization of HTC in last one year byFSW and MSM/TG in Nepal.
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3 112 **METHODS**
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6 113 **Study design**
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9 114 This study was a cross-sectional study involving secondary data of FSW and MSM/TG
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11 115 collected from IBBS survey of 2012 in Nepal.
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14 116 **Setting**
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17 117 Nepal, with a population of 27 million, is a low-middle income, land-locked country
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19 118 in South-East Asia[20]. It shares borders with China in the north and India to the south, east
20
21 119 and west. Nepal is divided into 75 districts and consists of a Himalayan mountainous region
22
23 120 in the north and open terrain (*Terai* in local language) in the south. HTC service was first
24
25 121 started in Nepal in 1995 by the National programme for AIDS and sexually transmitted
26
27 122 disease. There are over 235 HTC service sites in Nepal as of July 2016.
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30 123 *HTC in Nepal*
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33 124 In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to
34
35 125 identify people living with HIV and link them to treatment. It is voluntary and provided free
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37 126 of cost. Health facilitators should maintain confidentiality and obtain informed consent during
38
39 127 pre and post-test counselling. According to national guidelines, key populations are expected
40
41 128 to visit HTC in every 6-12 months[5]. Besides that, community-based interventions are also
42
43 129 prioritised in which peer educators and outreach workers are mobilised in the community.
44
45 130 Peer educators are volunteers who convey crucial information (proper condom use, HIV
46
47 131 testing, etc.) to key populations in informal (cruising areas like bus park or public park) and
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49 132 formal setting (drop-in centres) to distribute condoms, safe needles/ syringes or aware them
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51 133 about available treatment, care and support services.
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3 135 *IBBS 2012 Survey, Nepal*

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6 136 National Centre for AIDS and STD control (NCASC), Nepal, conducted two separate
7
8 137 cross-sectional IBBS surveys between September and November 2012 for FSW and
9
10 138 MSM/TG respectively. FSW were defined as “women aged 16 years and above reporting to
11
12 139 have been paid in cash or kind for sex with a male within the last six months.” MSM/TG were
13
14 140 defined as “those males aged 16 years or above who have had sexual relations (either oral or
15
16 141 anal) with another male in the 12 months preceding the survey.”(7). A survey among
17
18 142 FSW was conducted in 22 Terai highway districts and for MSM/TG in three districts of
19
20 143 Kathmandu valley (figure 1).

21 22 23 24 144 **Study population and sampling**

25
26
27 145 The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of
28
29 146 clusters, and stage 2 was the random selection of an equal number of participants from each
30
31 147 selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30
32
33 148 sex workers in that area; those with fewer than 30 sex workers were merged with nearby
34
35 149 locations to form a cluster. To identify clusters, mapping was performed with the support of
36
37 150 local non-governmental organisations to determine areas where sex work is common and
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39 151 noting the estimated number of possible survey participants in each area. Seventy clusters out
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41 152 of a total of 401 clusters were selected based on probability proportionate to size (PPS).

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46 153 The MSM were recruited using respondent driven sampling (RDS) in three districts of
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48 154 Kathmandu valley (Kathmandu, Lalitpur and Bhaktapur). To begin with, a total of eight
49
50 155 MSM/TG were recruited as seed. Those seeds were informed about survey protocols and
51
52 156 procedure and were encouraged to recruit other eligible individuals from their social networks
53
54 157 randomly to participate in the survey. These initial seeds were provided three coupons to pass
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56 158 to their peers who are eligible to participate in the survey.

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3 159 Detailed methodology and sampling strategies for IBBS surveys have been described
4
5 160 previously [10,13–15].
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11 162 **Data variables for the present study**

14 163 IBBS survey included information on behavioural factors like uptake of
15
16 164 interventions for HIV, demographic, behavioural, psychosocial and structural
17
18 165 variables[10,13,14]. Structural factors included environmental/context conditions which
19
20 166 were outside the control of the individual, but which could influence his/her perceptions,
21
22 167 behaviour and health [21]. Psychosocial variables (social support and depression) were
23
24 168 assessed using social support questionnaire short form (SSQS) and centre for
25
26 169 epidemiological studies depression (CES-D) scale respectively. The CES-D tool showed
27
28 170 high reliability and validity in assessing depression in diverse groups such as PLHIV,
29
30 171 women and MSM with Cronbach's alpha ≥ 0.85 and comparative fit indices more than
31
32 172 0.90[8,22]. The CES-D is extensively normed and validated tool[23]. Similarly the
33
34 173 reliability and construct validity of scale SSQS reported high (>0.90) by different studies
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36 174 [24,25].
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43 176 Median score of <5 in SSQS scale was interpreted as 'dissatisfied with social support'.
44
45 177 CES-D scale more than 16 and 22 were to classify distress and depression respectively. We
46
47 178 also assessed suicidality under psychosocial-related variables. Prevalence of demographic,
48
49 179 behavioural, psychosocial and structural factors have been summarised in **web-only table 1**.
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53 180 A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was
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55 181 chosen as the outcome variable. The outcome variable assessed by asking 'Have you visited
56
57 182 (Yes vs. No) any HTC centers in the last 12 months?' (Reasons for visiting: pre-post
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3 183 HIV/AIDS test counselling, information on HIV/AIDS window period, HIV/AIDS test result,
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5 184 counselling on using condom correctly in each sexual intercourse).In addition to
6
7 185 aforementioned reasons, discussion on safe injecting behaviour was also one of the self-
8
9 186 reported reasons among PWID for visitingHTCcentre.The independent variables
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11 187 (demographic, behavioural, psychosocial and structural risk variables)selected in this study
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14 188 have been described in web-only box 1.

17 189 **Analysis and statistics**

19
20 190 Data analysis was done separately for FSW and MSM/TG. Data was analysed
21
22 191 usingSTATA (version 12.1 STATA Corp., College Station, TX, USA).Categorical variables
23
24 192 were described using frequency and proportions. The unadjusted and adjusted analysis was
25
26 193 performed separately for FSW and MSM/TG to assess the association of factors with the
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28 194 outcome (not utilising HTC in last one year). All the RDS-related descriptive output were
29
30 195 adjusted to represent the structure of the study population (MSM/TG) which was based on
31
32 196 information regarding who recruited whom, and the relative size of the respondent's network
33
34 197 using the Volz–Heckathorn estimator (RDS II) (20).To assess the network size among
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36 198 MSM/TG, the following question was asked: “How many other MSM/TG do you know who
37
38 199 also know you well? (Knowing someone is defined as being able to contact them and having
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40 200 had to contact with them in the past 12 months).”RDS-adjusted values presented in web-only
41
42 201 table 2. Convergence plot for outcome variable is presented in web-only figure 1.Adjustment
43
44 202 for clustering of two-stage cluster sampling was not required in FSW data as it was a self-
45
46 203 weighted sample.

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52 204 .Bivariate associations between each independent variable and non-utilization of HTC
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54 205 were calculated using variance inflation factor after assessment for multicollinearity.Variables
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56 206 with a p-value of <0.2 in the bivariate analysis were included in the regression model (enter
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3 207 method). Adjusted prevalence ratios (aPR)with 95% confidence intervals (CI)were calculated
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5 208 by fitting a Poisson regression with robust variance estimates.The variables included in
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7 209 multivariate model (adjusted prevalence ratio)for FSWwereage group, educational status,
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9 210 condom use at last sex, ever inject drugs, ever participated in HIV awareness
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11 211 program,physical assault in last year, forced sex in last year, having dependents, police
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13 212 detention in last 6 months, stigma towards HIV and distress/depression.The variables included
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15 213 in adjusted prevalence ratio forMSM/TG were age group, condom use atlast sex, drinking
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17 214 alcohol, ever participated in HIV awareness programme, physical assault in last year, forced
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19 215 sex in last year, and discrimination in job and suicidal thought ‘ever’.

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24 216 Initially, we used the log-binomial model to assess the association between
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26 217 independent and outcome variable of interest. However, the log-binomial model fails to
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28 218 converge. To overcome the effects of failed convergence, we have used the Poisson
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30 219 regression with robust variance estimates as recommended by the Tyler et al.[26].Poisson
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32 220 regression with robust variance can be used as an alternative of logistic regression and also
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34 221 provides accurate estimates in the cross-sectional study with binary outcome of interest[27].
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36 222 We have calculated the prevalence ratio because it is easy to interpret than the odds ratio.
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41 224 **Ethical Considerations**

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44 225 Ethics approval for IBBS survey 2012 was given by the Nepal Health Research
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46 226 Council (NHRC), Kathmandu, Nepal.Ethics approval for the analysis of secondary data for
47
48 227 this study was taken in 2016 from Ethics Advisory Group, the International UnionAgainst
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50 228 Tuberculosis and Lung Disease (The Union), Paris, France.Administrative approval was also
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52 229 receivedfromNCASC and Public Health and Environment Research Center (PERC)
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55 230 Nepal.Waiver of informed consent was sought and approved by the ethics committee as this
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57 231 study involved analysis of secondary data.
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232 RESULTS

233 IBBS survey 2012 included 610 FSW with the response rate among FSW was 88.9%.

234 The non-responders were replaced by the randomly selected another FSW of the same
235 cluster. The HIV prevalence was 1 percent among FSW. The proportion of FSW in the age group
236 16 to 19 was 13.9%. The prevalence of non-utilization of HTC in last one year was 54%
237 among FSW. More than half FSW (59%) were married, 24% of them were divorced or
238 separated. Two-third (68%) of FSW were literate (Table 1 and web-only Table 1).

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

246 The factors associated with non-utilisation of HTC in last one year among FSW and
247 MSM/TG are summarised in **Table 1** and **Table 2** respectively. In multivariable analysis, the
248 association between non-utilisation of HTC and distress/depression remained significant. FSW
249 experiencing distress (APR: 1.4, 95% CI: 1.1–1.5) and depression (APR: 1.4, 95% CI: 1.1–1.6)
250 were more likely to non-utilization of HTC in the past year. Similarly FSW who were injecting
251 drugs (ever) (APR: 1.4, 95% CI: 1.1–1.8), ever participated in HIV awareness programmes
252 (APR: 1.2, 95% CI: 1.0–1.4), or no dependents in the family (APR: 1.1, 95% CI: 1.0–1.3)
253 were more likely to non-utilization of HTC. FSW who experienced forced sex (APR: 1.1, 95%
254 CI: 1.0–1.3) in the last 12 months were also more likely to non-utilization of HTC (Table 1).
255 episode

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

262

263 **Table 1.** Factors associated with non-utilization of HIV Testing and Counselling (HTC)
 264 centres among female sex workers surveyed under Integrated Biological and Behavioural
 265 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)
	20-24	130	73(56)
	>25	395	206 (52)
Educational Status	Illiterate	196	98 (50)
	Literate	414	232 (56)
Marital Status	Married	360	197 (55)
	Unmarried	102	60 (59)
	Separated/ Divorced	148	73 (49)
Having dependents	Yes	341	169 (50)
	No	269	161 (60)
Behavioural			
Condom use in last sex	Yes	461	256(56)
	No	149	74(32)
Ever inject drugs	Yes	40	29(73)
	No	570	301(53)
Structural			
Ever participated in HIV awareness programs	Yes	169	102(52)
	No	441	228(60)
Physical assault in last year	Yes	81	36 (44)
	No	529	294 (56)
Housing Instability	Homeless	15	6 (40)
	Own home	320	169 (53)
	Rented	275	155 (56)
Forced sex in last year	Yes	125	84 (67)
	No	485	246 (51)
Police detention in last 6 months	Yes	81	37 (46)
	No	529	293 (55)

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)	-

266 [@]Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust
 267 variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity
 268 checked; [#]Depression measured using a CES-D scale; [^]SSQS- The Social Support Questionnaire Score.
 269

270

271 **Table 2.** Factors associated with non-utilization of HIV Testing and Counselling (HTC)
 272 centres among Men having Sex with Men/Transgender surveyed under Integrated Biological
 273 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)	-

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

279 DISCUSSION

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

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3 297 (MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex
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5 298 (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG),
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7 299 forced sex in last one year (risk factor among FSW and protective factor among MSM/TG),
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10 300 absence of dependent members (FSW), physical assault in last year (MSM/TG); and
11
12 301 psychosocial: being distressed/depressed (FSW).

13
14 302 Psychosocial factors play an important role in health services utilisation [16].
15
16 303 FSW who had distress or depression (four out of every 10) had a higher prevalence of non-
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18 304 utilization of HTC. This could have resulted in disempowerment and thereby resulting in not
19
20 305 accessing HTC services when needed[13,14]. Studies have found that FSW used alcohol and
21
22 306 drugs, to reduce stress and to help them cope with their work[17,34]. Gambian study showed
23
24 307 that women who experienced forced sex reported severe depression[35]. A study conducted
25
26 308 among FSW working outside of the capital city (Kathmandu) found the very high prevalence
27
28 309 of depression and the experience of any form violence (verbal, physical and sexual) was also
29
30 310 common among them and also associated with depression[36]. Currently, there are no targeted
31
32 311 programs that address the mental health problems of FSW in Nepal and lack of laws that
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34 312 protect the rights of sex workers also exacerbating the experience of violence among them.
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36 313 Efforts addressing the experience of violence and its consequences (depression) among
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38 314 FSW are essential in Nepal otherwise it would be difficult to increase uptake of HTC among
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40 315 them.

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45 316 According to the IBBS survey report of 2012, old MSM/TG were found to use
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47 317 condoms more when compared to younger ones. Similarly, the median age of first sexual
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49 318 intercourse being 16 years and the fact that the old adolescents (16-19 years) MSM/TG did not
50
51 319 significantly access HTC is a cause of concern[10,13]. The risk-taking behaviour in
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53 320 adolescence can compound their risk in acquiring HIV, and hence this group need to be
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55 321 targeted. In Nepal, the blanket approach to implementing interventions (HTC) without
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3 322 considering the specific needs of adolescents or young people belonging to key populations
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5 323 might have effects in low uptake of HTC among them. Evidence from China suggests that the
6
7 324 use of peer-led community-based rapid HIV test increase the uptake of HIV testing among
8
9 325 young MSM[37].

10
11 326 Not visiting an HTC facility was also associated with not using a condom during last
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13 327 sex among MSM/TG.FSW who were injecting drugs were also less likely to uptake HTC in
14
15 328 the last 12 months. Our study findings are consistent with the study conducted among FSW in
16
17 329 Vietnam where unprotected sex and injecting drug use associated with less likely to have
18
19 330 voluntary HIV test [38]. The findings suggest that we are missing to reach those FSW who
20
21 331 were at increased risk for HIV due to their dual risky behaviours such as unprotected sex or
22
23 332 injecting drug abuse.

24
25 333 Some factors affecting utilisation of HTC by MSM/TG were different from that of
26
27 334 FSW. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs
28
29 335 among FSW. Among MSM/TG, the experience of forced sex led to the utilisation of HTC.
30
31 336 The difference might be due to the fact thatMSM/TG are highly networked population than
32
33 337 the FSW[39]suchasmost of them are directly and indirectly associated with their community
34
35 338 organisations (Blue Diamond Society) which work for the rights of gender and sexuality
36
37 339 minorities in Nepal. That may have resulted to seek available services among MSM/TG after
38
39 340 experiencing the sexual abuse.

40
41 341 Participation in HIV awareness programmes by key population showed decreasing
42
43 342 trend over the years [10,13]. Participation as a risk factor for non-utilisation of HTC for both
44
45 343 FSW and MSM/TG seemed intriguing. The activities which enlisted more participation were
46
47 344 short duration events like condom/AIDS day celebration compared to effective training
48
49 345 methods like demonstration classes, workshops,etc.(web-only table 1). These aforementioned
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51 346 short-term awareness activities might not have effective in awaringFSW and MSM/TG about
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3 347 the importance of HTC. The other explanation for this could be the cross-sectional nature of
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5 348 data. Those who had visited an HTC in last one year might not have felt the need for attending
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7 349 HIV awareness programmes.
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11 350 Despite being limited by a cross-sectional design, the findings of this study bring out
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13 351 three major policy implications. First, the intervention to address the burden of depression
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15 352 needs to be an integral part of programmes for FSW and MSM/TG at all levels. Second, HTC
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17 353 should be developed as an empowerment centre or training to improve their skills that help
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19 354 FSW and MSM/TG to tackle physical and sexual abuse. Third, specific prevention
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21 355 programmes should be rolled out to reach adolescent FSW and MSM/TG, and FSW who were
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23 356 practising dual risk behaviours such as inconsistent condom use or injecting drug use. The
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25 357 HTC centre should also consider the specific needs of adolescent FSW or MSM/TG.
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29 358 Our study adhered to STROBE guidelines for conduct and report of the study [40]. The
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31 359 findings are generalizable to FSW, and MSM/TG of Nepal as standard sampling strategy was
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33 360 followed for the IBBS survey [10,13–15]. The present study had inherent limitations of
34
35 361 analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in
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37 362 last 12 months among MSM/TG) could not be included in the analysis due to missing data.
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39 363 The limitations of the original survey like social desirability bias, recall bias due to the
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41 364 assessment of past exposures might have influenced the self-reported variables. The cross-
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43 365 sectional design itself could result in difficulties in ascertaining temporality between various
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45 366 factors studied and non-utilization of HTC.
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49 367 **CONCLUSION**

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52 368 To conclude, the psychosocial and structural factors are influencing utilisation of HIV
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54 369 testing and counselling centres among FSW and MSM/TG in Nepal. In addition to focussing
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56 370 on these risk factors, there is a need to improve HTCs to lend psychosocial support or to
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3 371 address the need of specific adolescent FSW and MSM/TG or FSW who also inject drugs.
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5 372 Creative behaviour change and communication strategies or interventions to improve skills to
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7 373 tackle physical and sexual abuse should be ensured to overcome the limitations of current
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9 374 programmes for key populations in Nepal.
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11 375

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17
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21
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16 401 authors were involved in analysis and interpretation of data; RS prepared the first draft, and
17
18 402 all authors were involved in critically reviewing the draft and approving the final draft for
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20 403 submission.
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23 404 **Data availability statement:** Data is available to the corresponding author and will be
24
25 405 provided on request.
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30 **Licence statement**

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3 531 **Figure Legend**
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6 532 **Figure 1.**Study districts included in Integrated Biological and Behavioural Surveillance
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8 533 (IBBS) survey 2012, Nepal.
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11 534 Figure footnote
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14 535 **MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW*
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16 536 *– female sex workers; KTM valley- Kathmandu valley*
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19 537 Web-only figure 1. Convergence plot for the outcome of interest.
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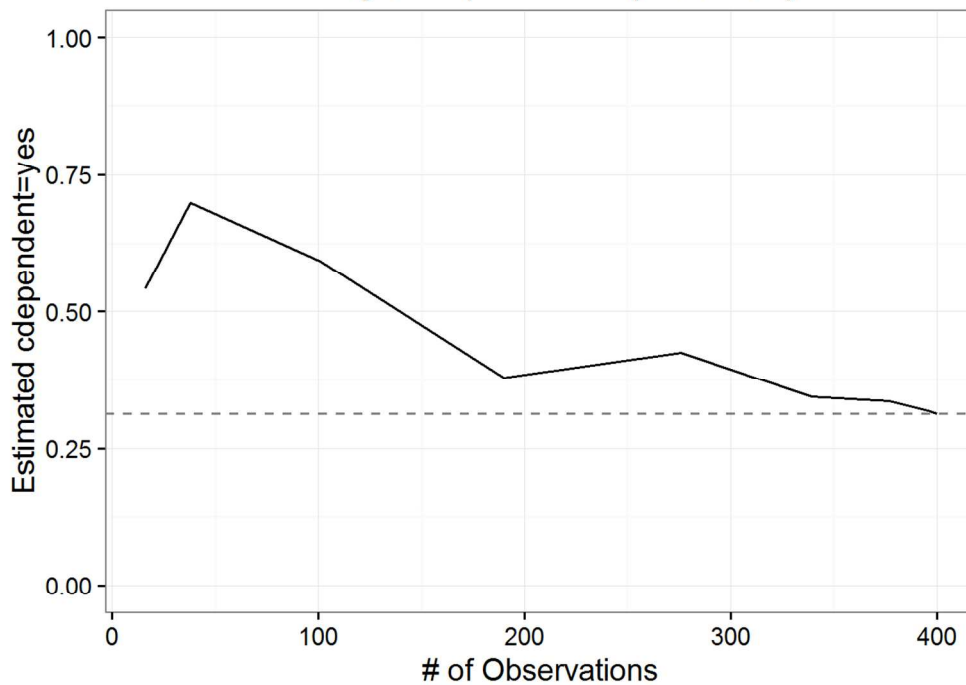
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Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal. Figure footnote *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers

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Convergence plot of cdependent=yes



view only

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)	

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5 *MSM/TG – Men who have sex with men/transgender, HIV- Human Immunodeficiency Virus., AIDS-
6 Acquired immune deficiency syndrome, HTC-HIV Testing and Counselling, ^SSQS- The Social Support
7 Questionnaire Score.
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3 Web-only box 1. Independent variables used in this study from the IBBS 2012 survey among
4 FSW and MSM/TG to determine Uptake of HTC, Nepal.
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8 **Demographic Factors:** Age, Educational Status, Marital Status, Having dependent
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10 **Behavioural Factors:** Condom Use last sex, Ever inject drug, Drinking alcohol
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13 **Psychosocial Factors:**

- 14 ✓ Among FSW: Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social
15 Support Questionnaire Score (SSQS)
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- 17 ✓ Among MSM/TG: Stigma towards HIV, Suicidal thoughts Ever, Depression, The
18 Social Support Questionnaire Score (SSQS)
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24 **Structural Factors:**

- 25 ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever
26 participated in HIV programs, Police detention in last 6 months, Physical assault last
27 year, Client refusal to pay after sex in last year
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- 29 ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical
30 assault last year, Experienced forced sex in last year, Discrimination in Job
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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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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

1 2 3 4 5 6 7	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.
8 9	Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
10	Study size	10	Explain how the study size was arrived at	Line 139-156
11 12 13 14 15	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34	Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	Done. Line 173-190. Lines 183-190. Not applicable. Lines 178-182
35			(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 (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	Line 203-204 Not applicable Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	Done. Line 204-207 No missing data Not applicable
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —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 (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Lines 209-214 Lines 162-166 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

1
2 results considering objectives, limitations,
3 multiplicity of analyses, results from similar
4 studies, and other relevant evidence

5	6	7	8
Generalisability	21	Discuss the generalisability (external validity) of the study results	Done. Line 299-300

9 **Other information**

10	11	12	13	14
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	

15
16 *Give information separately for cases and controls in case-control studies and, if applicable, for exposed and
17 unexposed groups in cohort and cross-sectional studies.

18
19 **Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and
20 published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely
21 available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at
22 <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is
23 available at www.strobe-statement.org.
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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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3 1 **Why don't key populations access HIV testing and counselling centres in**
4
5 2 **Nepal? Findings based on national surveillance survey**
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8
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40 16 **Running title:** IBBS 2012Nepal: factors for non-utilization of HTC
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48 19 **Keywords:** Key populations; HIV voluntary testing and counselling; MSM;
49 20 Transgender;FSW; SORT IT; Nepal
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1
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3 23 **ABSTRACT**
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6 24 **Objectives:** To assess the demographic, behavioural, psychosocial and structural factors
7
8 25 associated with non-utilization of HIV testing and counselling centres (HTC) by female sex
9
10 26 workers (FSW) and men who have sex with men/ transgender (MSM/TG).

11
12 27 **Methods:** This study involved a cross-sectional design. We used the national surveillance
13
14 28 survey data of 2012 which included 610 FSW and 400 MSM/TG recruited randomly from 22
15
16 29 and three districts of Nepal respectively. Adjusted prevalence ratio (aPR) and 0.95 confidence
17
18 30 interval (CI) using modified Poisson regression was used to assess and infer the association
19
20 31 between outcome (non-utilization of HTC in last year) and independent variables.
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22

23 32 **Results:** Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG.
24
25 33 The significant factors for non-utilization of HTC among FSW were:
26
27 34 depression [aPR=1.4(1.1-1.6)], injectable drug abuse (ever) [aPR=1.4(1.1-1.8)], participation
28
29 35 (ever) in HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in
30
31 36 previous year [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1(1.0-
32
33 37 1.3)]. Non-utilisation of HTC among MSM/TG had significant association with age 16-19
34
35 38 years [aPR=1.4(1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4)], participation (ever) in HIV
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37 39 awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-
38
39 40 3.1)], experience of forced sex in previous year [aPR=0.5(0.3-0.9)]
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44 41 **Conclusion:** Although limited by cross-sectional design, we found many programmatically
45
46 42 relevant findings. Creative strategies should be envisaged for effective behavioural change
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48 43 communication to improve access to HIV testing. Psychosocial and structural interventions
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50 44 should be integrated with HIV prevention programmes to support key populations in
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52 45 accessing HIV testing.
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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.

64 INTRODUCTION

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

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

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

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2
3 88 conducted in Nepal found that the non-utilization of HTC was low, i.e., around 50%in FSW
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5 89 and MSM/TG[8].
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8 90 There was a substantial decline in the proportion of FSW visiting HTC in 2016
9
10 91 compared to 2012 as revealed by IBBS 2016 [9]. Among FSW, decreasing trend in HIV
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12 92 prevalence was accompanied by an increasing trend in lack of comprehensive knowledge
13
14 93 regarding HIV [9,10]. The UNAIDS target of 90% assessment of HIV status by 2020 might
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16 94 not be reached in Nepal unless factors associated with non-utilization of HTC are identified
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18 95 and addressed [2,11,12].
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22 96 Psychosocial variables like distress/ depression were included only in IBBS 2012
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24 97 survey and were found to be high(40-50 percent) of the key population (people who inject
25
26 98 drugs, FSW and MSM/TG) studied[10,13,14].Different studies demonstrate that the
27
28 99 psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of
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30 100 HIV-related risk behaviours among FSW and MSM/TG in Nepal [15,16]. Studies conducted
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32 101 outside of Nepal (India and USA) among key populations (MSM/TG and FSW) found that the
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34 102 psychosocial (depression, substance abuse, violence) and structural factors not only increase
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36 103 their risk behaviours but also lowers the uptake of behavioural interventions.[17–19]. The
37
38 104 identification of effects of psychosocial and structural factors in the uptake of HTC would
39
40 105 help us to improve existing challenges of reaching key populations in Nepal. However such
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42 106 evidence is very limited in Nepal. Therefore using the IBBS 2012 data, we aimed to
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44 107 determine the demographic, behavioural, psychosocial and structural risk factors associated
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46 108 with non-utilization of HTC in last one-year by FSW and MSM/TG in Nepal.
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3 112 **METHODS**
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6 113 **Study design**
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9 114 This study was a cross-sectional study involving secondary data of FSW and MSM/TG
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11 115 collected from IBBS survey of 2012 in Nepal.
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14 116 **Setting**
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17 117 Nepal, with a population of 27 million, is a low-middle income, a beautiful landlocked
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19 118 country in South-East Asia[20]. It shares borders with China in the north and India to the
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21 119 south, east and west. Nepal is divided into 75 districts and consists of a Himalayan
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23 120 mountainous region in the north and open terrain (*Terai* in local language) in the south. HTC
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25 121 service was first started in Nepal in 1995 by the National Programme for AIDS and Sexually
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27 122 Transmitted Disease. There are over 235 HTC service sites in Nepal as of July 2016.
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30 123 *HTC in Nepal*
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33 124 In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to
34
35 125 identify people living with HIV and link them to treatment. It is voluntary and provided free
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37 126 of cost. Health facilitators should maintain confidentiality and obtain informed consent during
38
39 127 pre and post-test counselling. According to national guidelines, key populations are expected
40
41 128 to visit HTC in every 6-12 months[5]. Besides that, community-based interventions are also
42
43 129 prioritised in which peer educators and outreach workers are mobilised in the community.
44
45 130 Peer educators are volunteers who convey crucial information (proper condom use, HIV
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47 131 testing, etc.) to key populations in informal (cruising areas like bus park or public park) and
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49 132 formal setting (drop-in centres). They also distribute condoms, safe needles/ syringes or aware
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51 133 them about available treatment, care and support services.
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3 135 *IBBS 2012 Survey, Nepal*

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6 136 National Centre for AIDS and STD Control (NCASC), Nepal, conducted two separate
7
8 137 cross-sectional IBBS surveys between September and November 2012 for FSW and
9
10 138 MSM/TG respectively. FSW were defined as “*women aged 16 years and above reporting to*
11
12 139 *have been paid in cash or kind for sex with a male within the last six months.*” MSM/TG were
13
14 140 defined as “*men aged 16 years or above who have had sexual relations (either oral or anal)*
15
16 141 *with another male in the 12 months preceding the survey.*”(7). A survey among FSW was
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18 142 conducted in 22 *Terai* highway districts and for MSM/TG in three districts of Kathmandu
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20 143 valley (Kathmandu, Lalitpur and Bhaktapur) (**figure 1**).

21 22 23 24 144 **Study population and sampling**

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27 145 The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of
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29 146 clusters, and stage 2 was the random selection of an equal number of participants from each
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31 147 selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30
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33 148 sex workers in that area; those with fewer than 30 sex workers were merged with nearby
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35 149 locations to form a cluster. To identify clusters, mapping was performed with the support of
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37 150 local non-governmental organisations to determine areas where sex work is common and
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39 151 noting the estimated number of possible survey participants in each area. Seventy clusters out
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41 152 of a total of 401 clusters were selected based on probability proportionate to size (PPS).

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46 153 The MSM were recruited using respondent driven sampling (RDS) in three districts of
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48 154 Kathmandu valley. To begin with, a total of eight MSM/TG were recruited as seed. Those
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50 155 seeds were informed about survey protocols and procedure and were encouraged to recruit
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52 156 other eligible individuals from their social networks randomly to participate in the survey.
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54 157 These initial seeds were provided three coupons to pass to their peers who are eligible to
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56 158 participate in the survey.

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3 159 Detailed methodology and sampling strategies for IBBS surveys have been described
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5 160 previously [10,13–15].
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11 162 **Data variables for the present study**

14 163 IBBS survey included information on behavioural factors like uptake of
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16 164 interventions for HIV, demographic, behavioural, psychosocial and structural
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18 165 variables[10,13,14]. Structural factors included environmental/context conditions which
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20 166 were outside the control of the individual, but which could influence his/her perceptions,
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22 167 behaviour and health [21]. Psychosocial variables (social support and depression) were
23
24 168 assessed using social support questionnaire short form (SSQS) and centre for
25
26 169 epidemiological studies depression (CES-D) scale respectively. The CES-D tool showed
27
28 170 high reliability and validity in assessing depression in diverse groups such as PLHIV,
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30 171 women and MSM with Cronbach's alpha ≥ 0.85 and comparative fit indices more than
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32 172 0.90[22]. The CES-D is extensively normed and validated tool[23]. Similarly the reliability
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34 173 and construct validity of scale SSQS reported high (>0.90) by different studies [24,25].
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41 175 Median score of <5 in SSQS scale was interpreted as 'dissatisfied with available social
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43 176 support'. CES-D scale more than 16-21 and ≥ 22 were to classify distress and depression
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45 177 respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of
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47 178 demographic, behavioural, psychosocial and structural factors have been summarised in **web-**
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49 179 **only tables 1 and 2.**

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53 180 A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was
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55 181 chosen as the outcome variable. The outcome variable assessed by asking 'Have you visited
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57 182 (Yes vs. No) any HTC centers in the last 12 months?' (Reasons for visiting: pre-post
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3 183 HIV/AIDS test counselling, information on HIV/AIDS window period, HIV/AIDS test result,
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5 184 counselling on using condom correctly in each sexual intercourse). In addition to reasons
6
7 185 above, discussion on safe injecting behaviour was also one of the self-reported reasons among
8
9 186 PWID for visiting HTC. The independent variables (demographic, behavioural, psychosocial
10
11 187 and structural risk variables) selected in this study have been described in web-only box 1.
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14 15 188 **Analysis and statistics**

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18 189 Data analysis was done separately for FSW and MSM/TG. Data was analysed using
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20 190 STATA (version 12.1 STATA Corp., College Station, TX, USA).Categorical variables were
21
22 191 described using frequency and proportions. The unadjusted and adjusted analysis was
23
24 192 performed separately for FSW and MSM/TG to assess the association of factors with the
25
26 193 outcome variable (not utilising HTC in last one year). All the RDS-related descriptive output
27
28 194 were adjusted to represent the structure of the study population (MSM/TG) which was based
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30 195 on information regarding who recruited whom, and the relative size of the respondent's
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32 196 network using the Volz–Heckathorn estimator (RDS II) (20).To assess the network size
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34 197 among MSM/TG, the following question was asked: “How many other MSM/TG do you
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36 198 know who also know you well? (Knowing someone is defined as being able to contact them
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38 199 and having had to contact with them in the past 12 months).” RDS-adjusted values presented
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40 200 in web-only table 1. Convergence plot for outcome variable is shown in web-only figure
41
42 201 1.Adjustment for clustering of two-stage cluster sampling was not required in FSW data as it
43
44 202 was a self-weighted sample.
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50 203 Bivariate associations between each independent variable and non-utilization of HTC
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52 204 were calculated using variance inflation factor after assessment for multicollinearity.
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54 205 Variables with a p-value of <0.2 in the bivariate analysis were included in the regression
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56 206 model (enter method). Adjusted prevalence ratios (aPR)with 95% confidence intervals
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3 207 (CI)were calculated by fitting a Poisson regression with robust variance estimates. The
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5 208 variables included in multivariate model (adjusted prevalence ratio)for FSWwere age group,
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7 209 educational status, condom use at last sex, ever inject drugs, ever participated in HIV
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9 210 awareness program,physical assault in last year, forced sex in last year, having dependents,
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11 211 police detention in last 6 months, stigma towards HIV and distress/depression.The variables
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13 212 included in adjusted prevalence ratio for MSM/TG were an age group, condom use at last sex,
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15 213 drinking alcohol, ever participated in HIV awareness programme, physical assault in last year,
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17 214 forced sex in last year, and discrimination in job and suicidal thought ‘ever’.

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22 215 Initially, we used the log-binomial model to assess the association between
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24 216 independent and outcome variable of interest. However, the log-binomial model fails to
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26 217 converge. To overcome the effects of failed convergence, we have used the Poisson
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28 218 regression with robust variance estimates as recommended by the Tyler et al.[26].Poisson
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30 219 regression with robust variance can be used as an alternative of logistic regression and also
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32 220 provides accurate estimates in the cross-sectional study with binary outcome of interest[27].
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34 221 We have calculated the prevalence ratio because it is easy to interpret than the odds ratio. We
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36 222 also assessed associations between outcome and independent variables via Poisson model
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38 223 using individualised RDS weights (web-only table 3).

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43 44 225 **Ethical Considerations**

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46 226 Ethics approval for IBBS survey 2012 was given by the Nepal Health Research
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48 227 Council (NHRC), Kathmandu, Nepal. Approval for the analysis of secondary data for this
49
50 228 study was taken in 2016 from Ethics Advisory Group, the International Union Against
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52 229 Tuberculosis and Lung Disease (The Union), Paris, France. Administrative approval was also
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54
55 230 received from NCASC and Public Health and Environment Research Center (PERC) Nepal.

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3 231 Waiver of informed consent was sought and approved by the ethics committee as this study
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5 232 involved analysis of secondary data.
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8 233 **RESULTS**

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11 234 IBBS survey 2012 included 610 FSW with the response rate among FSW was 88.9%.
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13 235 The non-responders were replaced by the randomly selected another FSW of the same cluster.
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15 236 The HIV prevalence was 1 percent among FSW. The proportion of FSW in the age group 16
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17 237 to 19 was 13.9%. The prevalence of non-utilization of HTC in last one year was 54% among
18
19 238 FSW. More than half FSW (59%) were married, 24% of them were divorced or separated.
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21 239 Two-third (68%) of FSW were literate (Table 1 and web-only table 2).
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25
26 240 IBBS survey 2012 included 400 MSM/TG, and we did not record non-response among
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28 241 MSM/TG because of nature of sampling technique, i.e., study participants enrol the other
29
30 242 possible participants in the study. The HIV prevalence was 3.3 percent among MSM/TG. The
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32 243 proportion of MSM/TG in the age group 16 to 19 was 17.2%. Non-utilization of HTC in last
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34 244 one year was 55% for MSM/TG. The majority of the MSM/TG were unmarried (72%)
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36 245 whereas very few of them were illiterate (3%). Other characteristics of the FSW and MSM/TG
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38 246 are presented in web-only tables 1 and 2.
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42 247 The factors associated with non-utilisation of HTC in last one year among FSW and
43
44 248 MSM/TG are summarised in **Table 1** and **Table 2** respectively. In multivariable analysis, the
45
46 249 association between non-utilisation of HTC and distress/depression remained significant.
47
48 250 FSW experiencing distress (APR: 1.4, 95% CI: 1.1–1.5) and depression (APR: 1.4, 95% CI:
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50 251 1.1–1.6) were more likely to non-utilization of HTC in the past year. Similarly FSW who
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52 252 were injecting drugs (ever) (APR: 1.4, 95% CI: 1.1–1.8), ever participated in HIV awareness
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54 253 programmes (APR: 1.2, 95% CI: 1.0–1.4), or no dependents in the family (APR: 1.1, 95% CI:
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56 254 1.0–1.3) were more likely to non-utilization of HTC. FSW who experienced forced sex (APR:
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3 255 1.1, 95% CI: 1.0–1.3) in the last 12 months were also more likely to non-utilization of HTC
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5 256 (Table 1). episode
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8 257 MSM/TG who were adolescents aged 16-19 years (APR: 1.4, 95% CI: 1.1–1.7) and
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10 258 experienced physical assault (APR: 1.8, 95% CI: 1.0–3.1) were more likely to non-utilization
11
12 259 of HTC. However, MSM/TG who experienced forced sex (APR: 0.5, 95% CI: 0.3–0.9) were
13
14 260 less likely to non-utilization of HTC. MSM/TG who did not use condom during their last sex
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16 261 (APR: 1.2, 95% CI: 1.0–1.4) or participated in HIV awareness programs (APR: 1.6, 95% CI:
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18 262 1.3–2.0) were more likely to non-utilization of HTC (Table 2).
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264 **Table 1.** Factors associated with non-utilization of HIV Testing and Counselling (HTC)
265 centres among female sex workers surveyed under Integrated Biological and Behavioural
266 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)	-

267 [@]Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust
 268 variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity
 269 checked; [#]Depression measured using a CES-D scale; [^]SSQS- The Social Support Questionnaire Score.
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271

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

Variables		HTC not Utilised [@]		Adj PR**
		N	n(%) [‡]	
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)	-

275 **¥Unweighted descriptive statistics. For RDS-weighted estimates refer to web-only table 3; @Not utilised in**
 276 **last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust variance estimates**
 277 **(enter method); factors with Unadjusted PR with p<0.2 included in model and collinearity checked; #Depression**
 278 **measured using a CES-D scale; ^SSQS- The Social Support Questionnaire Score.**
 279

280 DISCUSSION

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

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3 296 possible in Nepal. This study also found different risk factors for non-utilization of HTC in
4
5 297 last one year among FSW and MSM/TG.They were demographic: late adolescents
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7 298 (MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex
8
9 299 (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG),
10
11 300 forced sex in last one year (risk factor among FSW and protective factor among MSM/TG),
12
13 301 absence of dependent members (FSW), physical assault in last year (MSM/TG); and
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15 302 psychosocial: being distressed/depressed (FSW).
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19 303 Psychosocial factors play an important role in health services utilisation [16]. FSW
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21 304 who had distress or depression (four out of every 10) had a higher prevalence of non-
22
23 305 utilization of HTC. This could have resulted in disempowerment and thereby resulting in not
24
25 306 accessing HTC services when needed[13,14].Studies have found that FSW used alcohol and
26
27 307 drugs, to reduce stress and to help them cope with their work[17,34].Gambian study showed
28
29 308 that women who experienced forced sex reported severe depression[35].A study conducted
30
31 309 among FSW working outside of the capital city (Kathmandu) found a very high prevalence of
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33 310 depression, and the experience of any form violence (verbal, physical and sexual) was also
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35 311 common among them and also associated with depression[36].Currently, there are no targeted
36
37 312 programs that address the mental health problems of FSW in Nepal and lack of laws that
38
39 313 protect the rights of sex workers also exacerbating the experience of violence among them.
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41 314 Efforts addressing the experience of violence and its consequences (depression) among FSW
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43 315 are essential in Nepal otherwise it would be difficult to increase uptake of HTC among them.
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47 316 According to the IBBS survey report of 2012, old MSM/TG were found to use
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49 317 condoms more when compared to younger ones. Similarly, the median age of first sexual
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51 318 intercourse being 16 years and the fact that the old adolescents (16-19 years) MSM/TG did not
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53 319 significantly access HTC is a cause of concern[10,13]. The risk-taking behaviour in
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55 320 adolescents can compound their risk in acquiring HIV, and hence this group need to be
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3 321 targeted. In Nepal, the blanket approach to implementing interventions (HTC) without
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5 322 considering the specific needs of adolescents or young people belonging to key populations
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7 323 might have effects in low uptake of HTC among them. Evidence from China suggests that the
8
9 324 use of peer-led community-based rapid HIV test increase the uptake of HIV testing among
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11 325 young MSM[37].

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14 326 Not visiting an HTC facility was also associated with not using a condom during last
15
16 327 sex among MSM/TG. FSW who were injecting drugs were also less likely to uptake HTC in
17
18 328 the last 12 months. Our study findings are consistent with the study conducted among FSW in
19
20 329 Vietnam where unprotected sex and injecting drug use associated with less likely to have
21
22 330 voluntary HIV test [38]. The findings suggest that we are missing to reach those FSW who
23
24 331 were at increased risk for HIV due to their risky dual behaviours such as unprotected sex or
25
26 332 injecting drug abuse.

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28
29 333 Some factors affecting utilisation of HTC by MSM/TG were different from that of
30
31 334 FSW. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs
32
33 335 among FSW. Among MSM/TG, the experience of forced sex led to the utilisation of HTC.
34
35 336 The difference might be due to the fact that MSM/TG are highly networked population than
36
37 337 the FSW[39]such as most of them are directly and indirectly associated with their community
38
39 338 organisations (Blue Diamond Society) which work for the rights of gender and sexuality
40
41 339 minorities in Nepal. That may have resulted to seek available services among MSM/TG after
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43 340 experiencing the sexual abuse.

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47 341 Participation in HIV awareness programmes by key population showed decreasing
48
49 342 trend over the years [10,13]. Participation as a risk factor for non-utilisation of HTC for both
50
51 343 FSW and MSM/TG seemed intriguing. The activities which enlisted more participation were
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53 344 short duration events like condom/AIDS day celebration compared to effective training
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55 345 methods like demonstration classes, workshops,etc.(web-only table 2). These aforementioned
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3 346 short-term awareness activities might not affect knowledge level of FSW and MSM/TG about
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5 347 the importance of HTC. The other explanation for this could be the cross-sectional nature of
6
7 348 data. Those who had visited an HTC in last one year might not have felt the need for attending
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9 349 HIV awareness programmes.

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12 350 Despite being limited by a cross-sectional design, the findings of this study bring out
13
14 351 three significant policy implications. First, the intervention to address the burden of
15
16 352 depression needs to be an integral part of programmes for FSW and MSM/TG at all levels.
17
18 353 Second, HTC should be developed as an empowerment centre or training to improve their
19
20 354 skills that help FSW and MSM/TG to tackle physical and sexual abuse. Third, specific
21
22 355 prevention programmes should be rolled out to reach adolescent FSW and MSM/TG, and
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24 356 FSW who were practising dual risk behaviours such as inconsistent condom use or injecting
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26 357 drug use. The HTC centre should also consider the specific needs of adolescent FSW or
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28 358 MSM/TG.

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32
33 359 Our study adhered to STROBE guidelines for conduct and report of the study [40].
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35 360 The findings are generalizable to FSW, and MSM/TG of Nepal as standard sampling strategy
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37 361 was followed for the IBBS survey [10,13–15]. The present study had inherent limitations of
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39 362 analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in
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41 363 last 12 months among MSM/TG) could not be included in the analysis due to missing data.
42
43 364 The limitations of the original survey like social desirability bias, recall bias due to the
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45 365 assessment of past exposures might have influenced the self-reported variables. The cross-
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47 366 sectional design itself could result in difficulties in ascertaining temporality between various
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49 367 factors studied and non-utilization of HTC.

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3 370 **CONCLUSION**
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6 371 To conclude, the psychosocial and structural factors are influencing utilisation of HIV
7
8 372 testing and counselling centres among FSW and MSM/TG in Nepal. In addition to focussing
9
10 373 on these risk factors, there is a need to improve HTC to lend psychosocial support or to
11
12 374 address the need of specific adolescent FSW and MSM/TG or FSW who also inject drugs.
13
14 375 Creative behaviour change and communication strategies or interventions to improve skills to
15
16 376 tackle physical and sexual abuse should be ensured to overcome the limitations of current
17
18 377 programmes for key populations in Nepal.
19
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25

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19 403

20
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26
27 407 submission.

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9 534 **Figure Legend**

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11 535 **Figure 1.**Study districts included in Integrated Biological and Behavioural Surveillance

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14 536 (IBBS) survey 2012, Nepal.

15
16
17 537 Figure footnote

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20 538 **MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs (we*

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22 539 *did not analyse PWID data), FSW – female sex workers; KTM valley- Kathmandu Valley*

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25 540 **Web-only figure 1.**Convergence plot for the outcome of interest.

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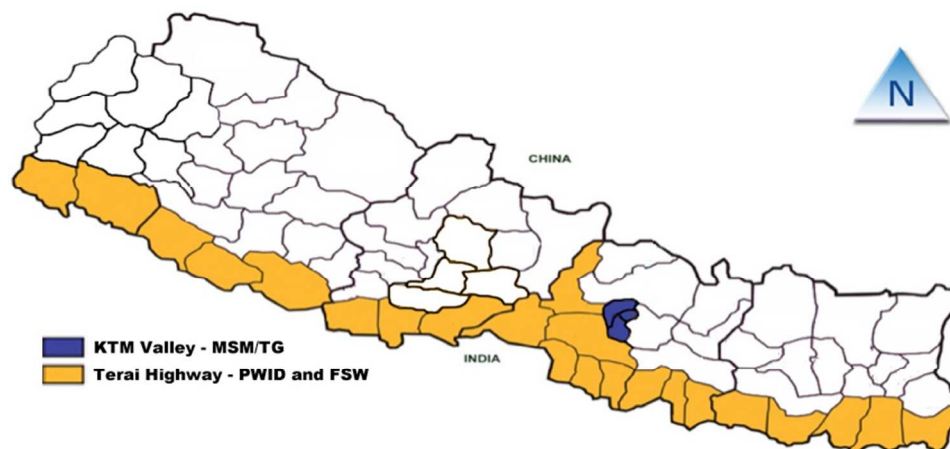
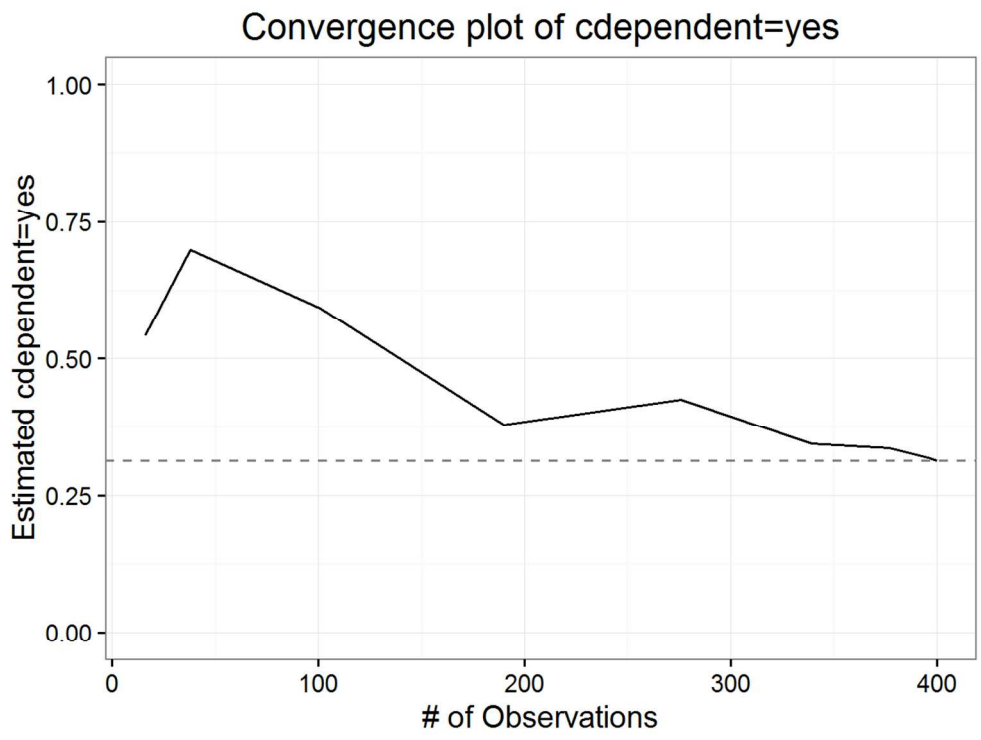


Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal. Figure footnote *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers

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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)	

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*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.

For peer review only

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			HTC not Utilised [@]	Adj PR ^{**}
		N	n(%) [‡]	
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.

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3 Web-only box 1. Independent variables used in this study from the IBBS 2012 survey among
4 FSW and MSM/TG to determine Uptake of HTC, Nepal.
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8 **Demographic Factors:** Age, Educational Status, Marital Status, Having dependent
9

10 **Behavioural Factors:** Condom Use last sex, Ever inject drug, Drinking alcohol
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13 **Psychosocial Factors:**

- 14 ✓ Among FSW: Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social
15 Support Questionnaire Score (SSQS)
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- 17 ✓ Among MSM/TG: Stigma towards HIV, Suicidal thoughts Ever, Depression, The
18 Social Support Questionnaire Score (SSQS)
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24 **Structural Factors:**

- 25 ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever
26 participated in HIV programs, Police detention in last 6 months, Physical assault last
27 year, Client refusal to pay after sex in last year
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- 30 ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical
31 assault last year, Experienced forced sex in last year, Discrimination in Job
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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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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

1 2 3 4 5 6 7	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.
8 9	Bias	9	Describe any efforts to address potential sources of bias	Lines 183-190
10	Study size	10	Explain how the study size was arrived at	Line 139-156
11 12 13 14 15	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Lines 173-190
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34	Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	Done. Line 173-190. Lines 183-190. Not applicable. Lines 178-182
35			(e) Describe any sensitivity analyses	Not applicable.

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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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	
		<i>Cross-sectional study</i> —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

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2 results considering objectives, limitations,
3 multiplicity of analyses, results from similar
4 studies, and other relevant evidence

5 Generalisability 21 Discuss the generalisability (external Done. Line 299-300
6 validity) of the study results

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8 **Other information**

9 Funding 22 Give the source of funding and the role of the Done. Line 315-333
10 funders for the present study and, if
11 applicable, for the original study on which
12 the present article is based

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15 *Give information separately for cases and controls in case-control studies and, if applicable, for exposed and
16 unexposed groups in cohort and cross-sectional studies.
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19 **Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and
20 published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely
21 available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at
22 <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is
23 available at www.strobe-statement.org.
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BMJ Open

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

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2017-017408.R3
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Primary Subject Heading:	Public health
Secondary Subject Heading:	HIV/AIDS, Public health, Sexual health
Keywords:	HIV & AIDS < INFECTIOUS DISEASES, Sex workers, MSM/TG, HIV Testing and Counselling

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Manuscripts

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3 1 **Why don't key populations access HIV testing and counselling centres in**
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5 2 **Nepal? Findings based on national surveillance survey**
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9 3 **Authors:** Rachana Shrestha^{1*}, Sairu Philip², Hemant Deepak Shewade³, Bir Rawal⁴, Keshab
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40 16 **Running title:** IBBS 2012Nepal: factors for non-utilization of HTC
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43 17 **Word count:** Abstract -246; Main text - 2577; Tables – 2; Figure – 1; Web-only table – 1;
44 18 Web-only table – 2; Web-only table – 3; Web-only box - 1
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48 19 **Keywords:** Key populations; HIV voluntary testing and counselling; MSM; Transgender;
49 20 FSW; SORT IT; Nepal
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3 **ABSTRACT**
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6 **Objectives:** To assess the demographic, behavioural, psychosocial and structural factors
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8 associated with non-utilization of HIV testing and counselling centres (HTC) by female sex
9
10 workers (FSW) and men who have sex with men/ transgender (MSM/TG).
11

12 **Methods:** This study involved a cross-sectional design. We used the national surveillance
13
14 survey data of 2012 which included 610 FSW and 400 MSM/TG recruited randomly from 22
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16 and three districts of Nepal respectively. Adjusted prevalence ratio (aPR) and 95% confidence
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18 interval (CI) using modified Poisson regression was used to assess and infer the association
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20 between outcome (non-utilization of HTC in last year) and independent variables.
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23 **Results:** Non-utilization of HTC in last one year was 54% for FSW and 55% for MSM/TG.
24
25 The significant factors for non-utilization of HTC among FSW were: depression
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27 [aPR=1.4(1.1-1.6)], injectable drug abuse (ever) [aPR=1.4(1.1-1.8)], participation (ever) in
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29 HIV awareness programmes [aPR=1.2 (1.0-1.4)], experience of forced sex in previous year
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31 [aPR=1.1 (1.0-1.3)] and absence of dependents in the family [aPR=1.1(1.0-1.3)]. Non-
32
33 utilisation of HTC among MSM/TG had significant association with age 16-19 years
34
35 [aPR=1.4(1.1-1.7)], non-condom use [aPR=1.2 (1.0-1.4)], participation (ever) in HIV
36
37 awareness programs [aPR=1.6 (1.3-2.0)], physical assault in previous year [aPR=1.8(1.0-
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39 3.1)], experience of forced sex in previous year [aPR=0.5(0.3-0.9)]
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42 **Conclusion:** Although limited by cross-sectional design, we found many programmatically
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44 relevant findings. Creative strategies should be envisaged for effective behavioural change
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46 communication to improve access to HIV testing. Psychosocial and structural interventions
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48 should be integrated with HIV prevention programmes to support key populations in
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50 accessing HIV testing.
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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.

64 INTRODUCTION

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

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

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

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3 88 conducted in Nepal found that the non-utilization of HTC was low, i.e., around 50%in FSW
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5 89 and MSM/TG[8].
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8 90 There was a substantial decline in the proportion of FSW visiting HTC in 2016
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10 91 compared to 2012 as revealed by IBBS 2016 [9]. Among FSW, decreasing trend in HIV
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12 92 prevalence was accompanied by an increasing trend in lack of comprehensive knowledge
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14 93 regarding HIV [9,10]. The UNAIDS target of 90% assessment of HIV status by 2020 might
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16 94 not be reached in Nepal unless factors associated with non-utilization of HTC are identified
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18 95 and addressed [2,11,12].
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22 96 Psychosocial variables like distress/ depression were included only in IBBS 2012
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24 97 survey and were found to be high(40-50 percent) of the key population (people who inject
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26 98 drugs, FSW and MSM/TG) studied[10,13,14].Different studies demonstrate that the
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28 99 psychosocial problems (depression, drug abuse and suicidality) increase the likelihood of
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30 100 HIV-related risk behaviours among FSW and MSM/TG in Nepal [15,16]. Studies conducted
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32 101 outside of Nepal (India and USA) among key populations (MSM/TG and FSW) found that the
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34 102 psychosocial (depression, substance abuse, violence) and structural factors not only increase
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36 103 their risk behaviours but also lowers the uptake of behavioural interventions.[17–19]. The
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38 104 identification of effects of psychosocial and structural factors in the uptake of HTC would
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40 105 help us to improve existing challenges of reaching key populations in Nepal. However such
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42 106 evidence is very limited in Nepal. Therefore using the IBBS 2012 data, we aimed to
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44 107 determine the demographic, behavioural, psychosocial and structural risk factors associated
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46 108 with non-utilization of HTC in last one-year by FSW and MSM/TG in Nepal.
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3 112 **METHODS**
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6 113 **Study design**
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9 114 This study was a cross-sectional study involving secondary data of FSW and MSM/TG
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11 115 collected from IBBS survey of 2012 in Nepal.
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14 116 **Setting**
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17 117 Nepal, with a population of 27 million, is a low-middle income, a beautiful landlocked
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19 118 country in South-East Asia[20]. It shares borders with China in the north and India to the
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21 119 south, east and west. Nepal is divided into 75 districts and consists of a Himalayan
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23 120 mountainous region in the north and open terrain (*Terai* in local language) in the south. HTC
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25 121 service was first started in Nepal in 1995 by the National Programme for AIDS and Sexually
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27 122 Transmitted Disease. There are over 235 HTC service sites in Nepal as of July 2016.
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30 123 *HTC in Nepal*
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33 124 In Nepal, HTC is the entry point for HIV prevention services whose primary aim is to
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35 125 identify people living with HIV and link them to treatment. It is voluntary and provided free
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37 126 of cost. Health facilitators should maintain confidentiality and obtain informed consent during
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39 127 pre and post-test counselling. According to national guidelines, key populations are expected
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41 128 to visit HTC in every 6-12 months[5]. Besides that, community-based interventions are also
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43 129 prioritised in which peer educators and outreach workers are mobilised in the community.
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45 130 Peer educators are volunteers who convey crucial information (proper condom use, HIV
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47 131 testing, etc.) to key populations in informal (cruising areas like bus park or public park) and
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49 132 formal setting (drop-in centres). They also distribute condoms, safe needles/ syringes or aware
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51 133 them about available treatment, care and support services.
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3 135 *IBBS 2012 Survey, Nepal*

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6 136 National Centre for AIDS and STD Control (NCASC), Nepal, conducted two separate
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8 137 cross-sectional IBBS surveys between September and November 2012 for FSW and
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10 138 MSM/TG respectively. FSW were defined as “*women aged 16 years and above reporting to*
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12 139 *have been paid in cash or kind for sex with a male within the last six months.*” MSM/TG were
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14 140 defined as “*men aged 16 years or above who have had sexual relations (either oral or anal)*
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16 141 *with another male in the 12 months preceding the survey.*”(7). A survey among FSW was
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18 142 conducted in 22 *Terai* highway districts and for MSM/TG in three districts of Kathmandu
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20 143 valley (Kathmandu, Lalitpur and Bhaktapur) (**figure 1**).

21 22 23 24 144 **Study population and sampling**

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27 145 The FSW were recruited using two-stage cluster sampling; stage 1 was the selection of
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29 146 clusters, and stage 2 was the random selection of an equal number of participants from each
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31 147 selected cluster to ensure a self-weighted sample. A cluster was defined as having at least 30
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33 148 sex workers in that area; those with fewer than 30 sex workers were merged with nearby
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35 149 locations to form a cluster. To identify clusters, mapping was performed with the support of
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37 150 local non-governmental organisations to determine areas where sex work is common and
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39 151 noting the estimated number of possible survey participants in each area. Seventy clusters out
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41 152 of a total of 401 clusters were selected based on probability proportionate to size (PPS).

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46 153 The MSM were recruited using respondent driven sampling (RDS) in three districts of
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48 154 Kathmandu valley. To begin with, a total of eight MSM/TG were recruited as seed. Those
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50 155 seeds were informed about survey protocols and procedure and were encouraged to recruit
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52 156 other eligible individuals from their social networks randomly to participate in the survey.
53
54 157 These initial seeds were provided three coupons to pass to their peers who are eligible to
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56 158 participate in the survey.

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3 159 Detailed methodology and sampling strategies for IBBS surveys have been described
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5 160 previously [10,13–15].
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11 162 **Data variables for the present study**

14 163 IBBS survey included information on behavioural factors like uptake of
15
16 164 interventions for HIV, demographic, behavioural, psychosocial and structural
17
18 165 variables[10,13,14]. Structural factors included environmental/context conditions which
19
20 166 were outside the control of the individual, but which could influence his/her perceptions,
21
22 167 behaviour and health [21]. Psychosocial variables (social support and depression) were
23
24 168 assessed using social support questionnaire short form (SSQS) and centre for
25
26 169 epidemiological studies depression (CES-D) scale respectively. The CES-D tool showed
27
28 170 high reliability and validity in assessing depression in diverse groups such as PLHIV,
29
30 171 women and MSM with Cronbach's alpha ≥ 0.85 and comparative fit indices more than
31
32 172 0.90[22]. The CES-D is extensively normed and validated tool[23]. Similarly the reliability
33
34 173 and construct validity of scale SSQS reported high (>0.90) by different studies [24,25].
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40 175 Median score of <5 in SSQS scale was interpreted as 'dissatisfied with available social
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42 176 support'. CES-D scale more than 16-21 and ≥ 22 were to classify distress and depression
43
44 177 respectively. We also assessed suicidality under psychosocial-related variables. Prevalence of
45
46 178 demographic, behavioural, psychosocial and structural factors have been summarised in **web-**
47
48 179 **only tables 1 and 2.**

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52
53 180 A self-reported visit to an HTC facility in past year by the FSW and MSM/TG was
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55 181 chosen as the outcome variable. The outcome variable assessed by asking 'Have you visited
56
57 182 (Yes vs. No) any HTC centers in the last 12 months?' (Reasons for visiting: pre-post
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3 183 HIV/AIDS test counselling, information on HIV/AIDS window period, HIV/AIDS test result,
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5 184 counselling on using condom correctly in each sexual intercourse). In addition to reasons
6
7 185 above, discussion on safe injecting behaviour was also one of the self-reported reasons among
8
9 186 PWID for visiting HTC. The independent variables (demographic, behavioural, psychosocial
10
11 187 and structural risk variables) selected in this study have been described in web-only box 1.
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14 15 188 **Analysis and statistics**

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18 189 Data analysis was done separately for FSW and MSM/TG. Data was analysed using
19
20 190 STATA (version 12.1 STATA Corp., College Station, TX, USA).Categorical variables were
21
22 191 described using frequency and proportions. The unadjusted and adjusted analysis was
23
24 192 performed separately for FSW and MSM/TG to assess the association of factors with the
25
26 193 outcome variable (not utilising HTC in last one year). All the RDS-related descriptive output
27
28 194 were adjusted to represent the structure of the study population (MSM/TG) which was based
29
30 195 on information regarding who recruited whom, and the relative size of the respondent's
31
32 196 network using the Volz–Heckathorn estimator (RDS II) (20).To assess the network size
33
34 197 among MSM/TG, the following question was asked: “How many other MSM/TG do you
35
36 198 know who also know you well? (Knowing someone is defined as being able to contact them
37
38 199 and having had to contact with them in the past 12 months).” RDS-adjusted values presented
39
40 200 in web-only table 1. Convergence plot for outcome variable is shown in web-only figure
41
42 201 1.Adjustment for clustering of two-stage cluster sampling was not required in FSW data as it
43
44 202 was a self-weighted sample.
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50 203 Bivariate associations between each independent variable and non-utilization of HTC
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52 204 were calculated using variance inflation factor after assessment for multicollinearity.
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54 205 Variables with a p-value of <0.2 in the bivariate analysis were included in the regression
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56 206 model (enter method). Adjusted prevalence ratios (aPR)with 95% confidence intervals
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3 207 (CI) were calculated by fitting a Poisson regression with robust variance estimates. The
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5 208 variables included in multivariate model (adjusted prevalence ratio) for FSW were age group,
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7 209 educational status, condom use at last sex, ever inject drugs, ever participated in HIV
8
9 210 awareness program, physical assault in last year, forced sex in last year, having dependents,
10
11 211 police detention in last 6 months, stigma towards HIV and distress/depression. The variables
12
13 212 included in adjusted prevalence ratio for MSM/TG were an age group, condom use at last sex,
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15 213 drinking alcohol, ever participated in HIV awareness programme, physical assault in last year,
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17 214 forced sex in last year, and discrimination in job and suicidal thought 'ever'.
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22 215 Initially, we used the log-binomial model to assess the association between
23
24 216 independent and outcome variable of interest. However, the log-binomial model fails to
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26 217 converge. To overcome the effects of failed convergence, we have used the Poisson
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28 218 regression with robust variance estimates as recommended by the Tyler et al.[26]. Poisson
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30 219 regression with robust variance can be used as an alternative of logistic regression and also
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32 220 provides accurate estimates in the cross-sectional study with binary outcome of interest[27].
33
34 221 We have calculated the prevalence ratio because it is easy to interpret than the odds ratio. We
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36 222 also assessed associations between outcome and independent variables via Poisson model
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38 223 using individualised RDS weights (web-only table 3).
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43 44 225 **Ethical Considerations**

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46 226 Ethics approval for IBBS survey 2012 was given by the Nepal Health Research
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48 227 Council (NHRC), Kathmandu, Nepal. Approval for the analysis of secondary data for this
49
50 228 study was taken in 2016 from Ethics Advisory Group, the International Union Against
51
52 229 Tuberculosis and Lung Disease (The Union), Paris, France. Administrative approval was also
53
54 230 received from NCASC and Public Health and Environment Research Center (PERC) Nepal.
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3 231 Waiver of informed consent was sought and approved by the ethics committee as this study
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5 232 involved analysis of secondary data.
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8 233 **RESULTS**

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11 234 IBBS survey 2012 included 610 FSW with the response rate among FSW was 88.9%.
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13 235 The non-responders were replaced by the randomly selected another FSW of the same cluster.
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15 236 The HIV prevalence was 1 percent among FSW. The proportion of FSW in the age group 16
16
17 237 to 19 was 13.9%. The prevalence of non-utilization of HTC in last one year was 54% among
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19 238 FSW. More than half FSW(59%) were married, 24% of them were divorced or separated.
20
21 239 Two-third (68%) of FSW were literate (Table 1 and web-only table 2).
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24
25 240 IBBS survey 2012 included 400 MSM/TG, and we did not record non-response among
26
27 241 MSM/TG because of nature of sampling technique, i.e., study participants enrol the other
28
29 242 possible participants in the study. The HIV prevalence was 3.3 percent among MSM/TG. The
30
31 243 proportion of MSM/TG in the age group 16 to 19 was 17.2%. Non-utilization of HTC in last
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33 244 one year was 55% for MSM/TG. The majority of the MSM/TG were unmarried (72%)
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35 245 whereas very few of them were illiterate (3%). Other characteristics of the FSW and MSM/TG
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37 246 are presented in web-only tables 1 and 2.
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41
42 247 The factors associated with non-utilisation of HTC in last one year among FSW and
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44 248 MSM/TG are summarised in **Table 1** and **Table 2** respectively. In multivariable analysis, the
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46 249 association between non-utilisation of HTC and distress/depression remained significant.
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48 250 FSW experiencing distress (APR: 1.4, 95% CI: 1.1–1.5) and depression (APR: 1.4, 95% CI:
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50 251 1.1–1.6) were more likely to non-utilization of HTC in the past year. Similarly FSW who
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52 252 were injecting drugs (ever) (APR: 1.4, 95% CI: 1.1–1.8), ever participated in HIV awareness
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54 253 programmes (APR: 1.2, 95% CI: 1.0–1.4), or no dependents in the family (APR: 1.1, 95% CI:
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56 254 1.0–1.3) were more likely to non-utilization of HTC. FSW who experienced forced sex (APR:
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3 255 1.1, 95% CI: 1.0–1.3) in the last 12 months were also more likely to non-utilization of HTC
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5 256 (Table 1). episode

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8 257 MSM/TG who were adolescents aged 16-19 years(APR: 1.4, 95% CI: 1.1–1.7) and
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10 258 experienced physical assault(APR: 1.8, 95% CI: 1.0–3.1) were more likely to non-utilization
11
12 259 of HTC. However, MSM/TG who experienced forced sex(APR: 0.5, 95% CI: 0.3–0.9) were
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14 260 less likely to non-utilization of HTC. MSM/TG who did not use condom during their last sex
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16 261 (APR: 1.2, 95% CI: 1.0–1.4) or participated in HIV awareness programs (APR: 1.6, 95% CI:
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18 262 1.3–2.0) were more likely to non-utilization of HTC (Table 2).

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22 263 We also assessed the association between independent variables and outcome variable via
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24 264 Poisson model using individualised RDS weights. But not much variation was observed in
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26 265 the results of the weighted and unweighted analysis (web-only table 3).

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30 266 **Table 1.** Factors associated with non-utilization of HIV Testing and Counselling (HTC)
31 267 centres among female sex workers surveyed under Integrated Biological and Behavioural
32 268 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)	-

269 @Not utilised in last one year; * p<0.05; **Adjusted prevalence ratio using Poisson regression with robust
 270 variance estimates (enter method); factors with Unadjusted PR with p<0.2 included in the model and collinearity
 271 checked; [#]Depression measured using a CES-D scale; [^]SSQS- The Social Support Questionnaire Score.
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273

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

Variables		HTC not Utilised [@]		Adj PR**
		N	n(%) [‡]	
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)	-

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

282 DISCUSSION

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

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3 296 settings[33] need to be evaluated in the context of Nepal. Otherwise, the 90-90-90 targets
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5 297 prioritised to improve health and prevention of secondary HIV transmission would not be
6
7 298 possible in Nepal. This study also found different risk factors for non-utilization of HTC in
8
9 299 last one year among FSW and MSM/TG.They were demographic: late adolescents
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11 300 (MSM/TG); behavioural: injectable drug abuse (FSW) and no condom use at last sex
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13 301 (MSM/TG); structural: participation in HIV awareness programmes (FSW and MSM/TG),
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15 302 forced sex in last one year (risk factor among FSW and protective factor among MSM/TG),
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17 303 absence of dependent members (FSW), physical assault in last year (MSM/TG); and
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19 304 psychosocial: being distressed/depressed (FSW).
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23 305 Psychosocial factors play an important role in health services utilisation [16]. FSW
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25 306 who had distress or depression (four out of every 10) had a higher prevalence of non-
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27 307 utilization of HTC. This could have resulted in disempowerment and thereby resulting in not
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29 308 accessing HTC services when needed[13,14].Studies have found that FSW used alcohol and
30
31 309 drugs, to reduce stress and to help them cope with their work[17,34].Gambian study showed
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33 310 that women who experienced forced sex reported severe depression[35].A study conducted
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35 311 among FSW working outside of the capital city (Kathmandu) found a very high prevalence of
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37 312 depression, and the experience of any form violence (verbal, physical and sexual) was also
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39 313 common among them and also associated with depression[36].Currently, there are no targeted
40
41 314 programs that address the mental health problems of FSW in Nepal and lack of laws that
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43 315 protect the rights of sex workers also exacerbating the experience of violence among them.
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45 316 Efforts addressing the experience of violence and its consequences (depression) among FSW
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47 317 are essential in Nepal otherwise it would be difficult to increase uptake of HTC among them.
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51 318 According to the IBBS survey report of 2012, old MSM/TG were found to use
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53 319 condoms more when compared to younger ones. Similarly, the median age of first sexual
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55 320 intercourse being 16 years and the fact that the old adolescents (16-19 years) MSM/TG did not
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3 321 significantly access HTC is a cause of concern[10,13]. The risk-taking behaviour in
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5 322 adolescents can compound their risk in acquiring HIV, and hence this group need to be
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7 323 targeted. In Nepal, the blanket approach to implementing interventions (HTC) without
8
9 324 considering the specific needs of adolescents or young people belonging to key populations
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11 325 might have effects in low uptake of HTC among them. Evidence from China suggests that the
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13 326 use of peer-led community-based rapid HIV test increase the uptake of HIV testing among
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15 327 young MSM[37].

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18 328 Not visiting an HTC facility was also associated with not using a condom during last
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20 329 sex among MSM/TG. FSW who were injecting drugs were also less likely to uptake HTC in
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22 330 the last 12 months. Our study findings are consistent with the study conducted among FSW in
23
24 331 Vietnam where unprotected sex and injecting drug use associated with less likely to have
25
26 332 voluntary HIV test [38]. The findings suggest that we are missing to reach those FSW who
27
28 333 were at increased risk for HIV due to their risky dual behaviours such as unprotected sex or
29
30 334 injecting drug abuse.

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34 335 Some factors affecting utilisation of HTC by MSM/TG were different from that of
35
36 336 FSW. In events like forced sex in last year among FSW, it reduced the utilisation of HTCs
37
38 337 among FSW. Among MSM/TG, the experience of forced sex led to the utilisation of HTC.
39
40 338 The difference might be due to the fact that MSM/TG are highly networked population than
41
42 339 the FSW[39]such as most of them are directly and indirectly associated with their community
43
44 340 organisations (Blue Diamond Society) which work for the rights of gender and sexuality
45
46 341 minorities in Nepal. That may have resulted to seek available services among MSM/TG after
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48 342 experiencing the sexual abuse.

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51 343 Participation in HIV awareness programmes by key population showed decreasing
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53 344 trend over the years [10,13]. Participation as a risk factor for non-utilisation of HTC for both
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55 345 FSW and MSM/TG seemed intriguing. The activities which enlisted more participation were
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3 346 short duration events like condom/AIDS day celebration compared to effective training
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5 347 methods like demonstration classes, workshops,etc.(web-only table 2). These aforementioned
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7 348 short-term awareness activities might not affect knowledge level of FSW and MSM/TG about
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9 349 the importance of HTC. The other explanation for this could be the cross-sectional nature of
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11 350 data. Those who had visited an HTC in last one year might not have felt the need for attending
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13 351 HIV awareness programmes.

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17 352 Despite being limited by a cross-sectional design, the findings of this study bring out
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19 353 three significant policy implications. First, the intervention to address the burden of
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21 354 depression needs to be an integral part of programmes for FSW and MSM/TG at all levels.
22
23 355 Second, HTC should be developed as an empowerment centre or training to improve their
24
25 356 skills that help FSW and MSM/TG to tackle physical and sexual abuse. Third, specific
26
27 357 prevention programmes should be rolled out to reach adolescent FSW and MSM/TG, and
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29 358 FSW who were practising dual risk behaviours such as inconsistent condom use or injecting
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31 359 drug use. The HTC centre should also consider the specific needs of adolescent FSW or
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33 360 MSM/TG.

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37 361 Our study adhered to STROBE guidelines for conduct and report of the study [40].
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39 362 The findings are generalizable to FSW, and MSM/TG of Nepal as standard sampling strategy
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41 363 was followed for the IBBS survey [10,13–15]. The present study had inherent limitations of
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43 364 analysing secondary data. Certain pertinent variables (for example; injectable drug abuse in
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45 365 last 12 months among MSM/TG) could not be included in the analysis due to missing data.
46
47 366 The limitations of the original survey like social desirability bias, recall bias due to the
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49 367 assessment of past exposures might have influenced the self-reported variables. The cross-
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51 368 sectional design itself could result in difficulties in ascertaining temporality between various
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53 369 factors studied and non-utilization of HTC.
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3 370 **CONCLUSION**
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6 371 To conclude, the psychosocial and structural factors are influencing the utilisation of
7
8 372 HIV testing and counselling centres among FSW and MSM/TG in Nepal. In addition to
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10 373 focussing on these risk factors, there is a need to improve HTC to lend psychosocial support
11
12 374 or to address the need of specific adolescent FSW and MSM/TG or FSW who also inject
13
14 375 drugs. Creative behaviour change and communication strategies or interventions to improve
15
16 376 skills to tackle physical and sexual abuse should be ensured to overcome the limitations of
17
18 377 current programmes for key populations in Nepal.
19
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23
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25

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43
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20 403

21
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23
24 405 authors were involved in analysis and interpretation of data; RS prepared the first draft, and
25
26 406 all authors were involved in critically reviewing the draft and approving the final draft for
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28 407 submission.
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31 408 **Data availability statement:** Data is available to the corresponding author and will be
32
33 409 provided on request.
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36 410 **Provenance and peer review:** Not commissioned; externally peer reviewed.
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40 **Licence statement**

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3 532 **Figure Legend**
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6 533 **Figure 1.**Study districts included in Integrated Biological and Behavioural Surveillance
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8 534 (IBBS) survey 2012, Nepal.
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11 535 Figure footnote
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14 536 **MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs (we*
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16 537 *did not analyse PWID data), FSW – female sex workers; KTM valley- Kathmandu Valley*
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19 538 **Web-only figure 1.**Convergence plot for the outcome of interest.
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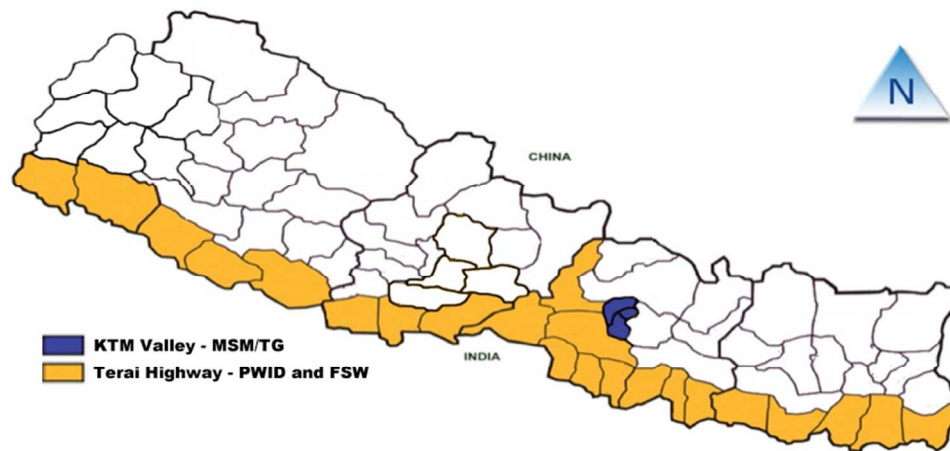
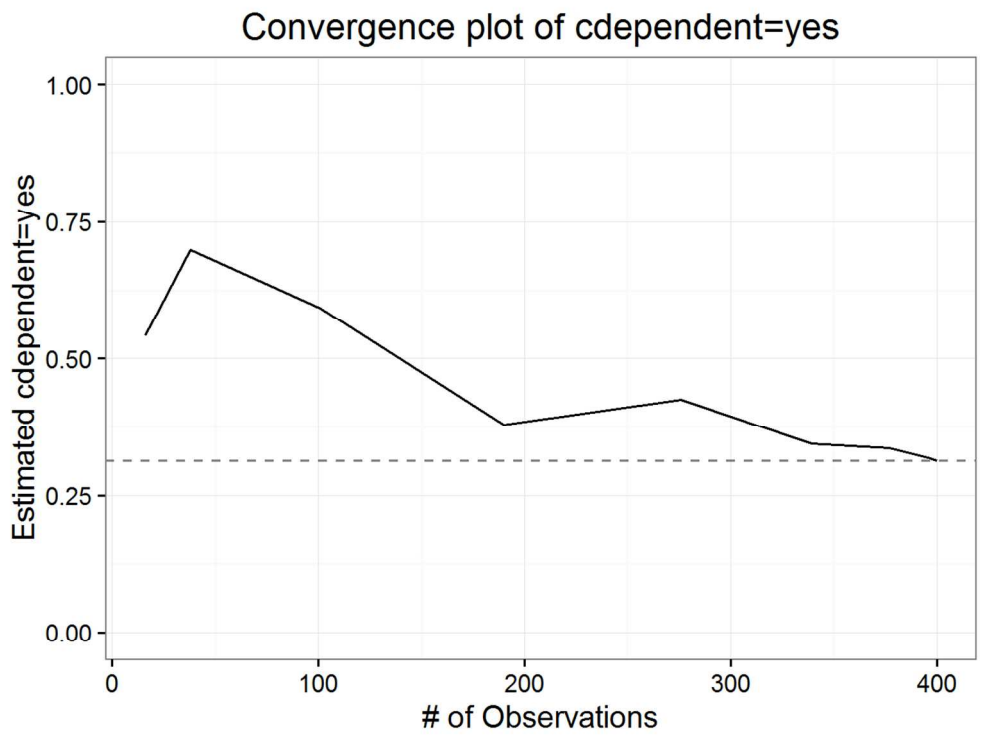


Figure 1. Study districts included in Integrated Biological and Behavioural Surveillance (IBBS) survey 2012, Nepal. Figure footnote *MSM/TG – Men who have sex with men/transgender, PWID – people who inject drugs, FSW – female sex workers

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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)	

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*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.

For peer review only

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			HTC not Utilised [@]	Adj PR ^{**}
		N	n(%) [‡]	
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.

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3 Web-only box 1. Independent variables used in this study from the IBBS 2012 survey among
4 FSW and MSM/TG to determine Uptake of HTC, Nepal.
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8 **Demographic Factors:** Age, Educational Status, Marital Status, Having dependent
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10 **Behavioural Factors:** Condom Use last sex, Ever inject drug, Drinking alcohol
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13 **Psychosocial Factors:**

- 14 ✓ Among FSW: Stigma towards HIV, Suicidal thoughts Ever, Depression, The Social
15 Support Questionnaire Score (SSQS)
16
- 17 ✓ Among MSM/TG: Stigma towards HIV, Suicidal thoughts Ever, Depression, The
18 Social Support Questionnaire Score (SSQS)
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24 **Structural Factors:**

- 25 ✓ Among FSW: Housing Instability, Experienced forced sex in last year, Ever
26 participated in HIV programs, Police detention in last 6 months, Physical assault last
27 year, Client refusal to pay after sex in last year
28
- 29 ✓ Among MSM/TG: Housing Instability, Ever participated in HIV programs, Physical
30 assault last year, Experienced forced sex in last year, Discrimination in Job
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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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	Done. Line 139-158 (cross-sectional analytic study)
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	Lines 178-182
		(e) Describe any sensitivity analyses	Not applicable.

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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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	Not applicable
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	
		<i>Cross-sectional study</i> —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

1
2 results considering objectives, limitations,
3 multiplicity of analyses, results from similar
4 studies, and other relevant evidence

5 Generalisability 21 Discuss the generalisability (external Done. Line 299-300
6 validity) of the study results

7
8 **Other information**

9 Funding 22 Give the source of funding and the role of the Done. Line 315-333
10 funders for the present study and, if
11 applicable, for the original study on which
12 the present article is based
13
14

15
16 *Give information separately for cases and controls in case-control studies and, if applicable, for exposed and
17 unexposed groups in cohort and cross-sectional studies.
18

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