

**Determinants of voluntary HIV counseling and testing (VCT) uptake among men who
have sex with men (MSM) in Nepal**

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Table of Contents

Abstract	iv
List of Abbreviations.....	vii
1. Introduction	1
1.1 Global, regional Situation of HIV/AIDS	1
1.2 HIV Testing and Counseling	1
1.3 HIV/AIDS and the use of VCT among MSM	2
1.4 The HIV epidemic and MSM in Nepal	3
2. Rational of study	3
3. Overall Aim.....	4
3.1 General objective	4
3.2 Specific objectives	4
4. Methods:.....	5
4.1 Study Area:	5
The study explored 15 districts of Nepal (Figure 1).....	5
4.2 Study population.....	5
4.3 Sampling and Recruitment	5
4.4 Study design	6
4.5 Conceptual framework and study variables:	6
4.6 Statistical analysis.....	9
4.7 Ethical consideration	9
5. Results	10
5.1 Participants’ characteristics	10
5.2 Predisposing Factors.....	10
5.3 Enabling Factor.....	12
5.4 Need Factors	13
5.5 Health Care System	14
5.6 Final multivariate model.....	14
6. Discussion	17

List of Tables

Table 1. Utilization of VCT in relation to Predisposing Factors	11
Table 2 Utilization of VCT in relation to Potential Enabling Factors	12
Table 3 Utilization of VCT in relation to potential Need Factors.....	13
Table 4 Utilization of VCT in relation to Health Care System.....	14
Table 5 Final Multivariate analyses factors predicting ever use of VCT.....	15

List of Figures

Figure 1 Study Districts (26).....	5
Figure 2 Conceptual Framework.....	7
Figure 3 Measures of Access of VCT.....	15

Abstract

Background: In an era of treatment as prevention, voluntary HIV counseling and testing (VCT) is a crucial point to link individuals with HIV infection with treatment, care and support. VCT also promotes safer behavior (e.g. use of condoms) among both HIV-positive and HIV-negative individuals. In Nepal, the epidemic is concentrated among the most vulnerable populations, such as men who have sex with men (MSM). The 2012 bio-behavioral survey findings suggest that the uptake of VCT is 44.8% among MSM despite rapid expansion of interventions in Nepal. This study looks at the determinants of VCT uptake among MSM using Anderson's model of the utilization of health care.

Methods: A cross-sectional survey was carried out between September and November 2010 through snowball sampling to recruit 339 MSM, aged 15 or older, from 15 districts of Nepal. The dependent variable was if they had ever used VCT services. The independent factors included were categorized as predisposing, enabling, need and health system factors, in accordance with Anderson's model of health care utilization. Associations between the independent and the dependent variables were examined using bivariate and multivariate logistic regression analysis in SPSS. The analyses were adjusted for clustering.

Results: Among the 339 MSM interviewed, 87% reported they had at some time used VCT services. The predisposing factors associated with being less likely to have used VCT services were being unemployed (adjusted odds ratio (AOR) 0.27, 95% confidence interval (CI) 0.10-0.72), and belonging to the middle caste (AOR 0.20, 95% CI 0.10-0.57). Lack of the enabling factor - 'family acceptance of same sex behavior' – was inversely associated with ever having used VCT (AOR 0.34, 95% CI 0.16-0.73). The need factor - 'use of illicit drugs' (AOR 0.18, 95% CI 0.07-0.48) - was also inversely associated with having used VCT services, whereas condom rupture during last anal sex was positively associated with having made a visit for VCT (AOR 3.19, 95% CI 1.19-8.51). Unavailability of VCT services in the district was a barrier to having used VCT (AOR 0.44, 95% CI 0.29-0.66).

Conclusions: The study findings suggest that VCT is used by the MSM who are at high risk of HIV through condom rupture, but inequitable geographical distribution of VCT services (most concentrated in urban areas) obstructs the uptake of VCT among MSM in Nepal. Efforts to increase VCT use among MSM need to be targeted at those MSM who are middle

caste and/or unemployed. A more holistic approach, including efforts to address lack of family acceptance and illicit drug-use, is required to increase using VCT among MSM in Nepal.

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List of Abbreviations

AIDS: Acquired Immunodeficiency Syndrome

BDS: Blue Diamond Society

FSW: Female Sex Workers

HIV: Human Immunodeficiency Virus

IBBS: Integrated Bio-behavioral Survey

MARP: Most at Risk Populations

MSM: Men who have sex with men

NCASC: National Center for AIDS and STD Control

NHRC: Nepal Health Research Council

NGOs: Non-governmental organizations

PWIDs: People who Inject Drugs

PITC: Provider initiated Testing and Counselling

STD: Sexually Transmitted Disease

STI: Sexually Transmitted Infection

UNAIDS: Joint United Nations Program on HIV/AIDS

VCT: HIV Voluntary Counseling and Testing

1. Introduction

1.1 Global, regional Situation of HIV/AIDS

The number of people living with HIV globally in 2013 was 35 million people (33.2-37.2 million) (1). An estimated 2.1 (1.9-2.4) million people were newly infected with HIV (1). In 2012, an estimated 1.6 million (1.4-1.9 million) AIDS-related deaths occurred worldwide compared to 2.3 million (2.1-2.6 million) in 2005, which indicates that treatment has become more accessible, prevention has increased and mortality reduced (2). In Asia, the burden of the HIV epidemic is also high, where an estimated 4.1 million people are infected with HIV (2-4). According to UNAIDS more than 370,000 people in 2011 were newly infected by HIV (5). HIV prevalence in Asia is concentrated among key populations, such as people who inject drugs (PWID), MSM and sex workers.

1.2 HIV Testing and Counseling

VCT help both; those who test negative can learn ways to avoid becoming infected, and those who are positive can learn how to live longer, healthier lives and prevent transmission to others (6). Surveys have shown that VCT is effective in influencing individual risky behavior among people living with HIV through counselling, knowledge and education about HIV/AIDS. In Meta-analysis, analysis of clinic-based VCT, employment-based, mobile VCT and home-based VCT in the developing countries found that those who received VCT were more effective in reducing the number of sexual partners and increases the use of condom among studied HIV infected people (7). A meta-analysis of published and unpublished reports from 1988 through December 2007 found that behavioral interventions (counselling and HIV testing, peer education, assertiveness and relationship support, discussing attitudes and beliefs, videos) targeted to MSM, was effective in reducing the level of unprotected anal sex (8).

VCT consists of pre- and post-test counseling, and informing clients about their HIV status through anonymous HIV testing. In pretest counseling, the counselors assess the clients' risk behavior, prepare them for their HIV test result, and post-test counsel them on coping with HIV and adopting strategies that reduce risk. This also provides a link to further HIV treatment, care and support, as and when necessary. If an individual is HIV-negative at post-test counselling, he or she will be prepared for risk reduction approaches, whereas HIV-

positive individual are prepared for immediate emotional support, possible coping strategies, follow-up with supporting counselling, and medical care (8,9). VCT is hypothesized to influence several intermediate outcomes, such as increasing knowledge on HIV risk reduction strategies, beliefs, attitudes and behaviors, which in turn is thought to help clients take up safer and healthier behavior that can affect health outcomes (i.e. the risk of HIV infection) in the future (9).

Facility-based and Community-based are two approaches to HIV Testing and Counseling. Basically, the latter approach is concerned with building trust among public, supporting human rights and reducing the stigma and discrimination associated with HIV (10). It is also implemented in various contexts, such as home-based (door-to-door), workplace, and school or college. In contrast the facility-based approach offers the provider initiated testing and counselling (PITC), also called as opt-out, whereas client initiated VCT is known as opt-in (11). In PITC, the health care provider recommends HIV testing to clients who have higher risk sexual behaviour and are considered to have some symptoms or signs of disease (10). In a generalized epidemic, all clients are offered a test with PITC. Client-initiated HIV testing and counselling is for individual risk assessment, in which clients voluntarily come to health facilities to learn know their HIV status (10).

The utilization of VCT varies according to different settings (12). Some evidence shows that the factors affecting use of VCT are knowledge, fear, risk perception, cost of HIV testing, confidentiality, and availability of treatment, sexual activity and quality of services (13-15). In the era of treatment as a prevention - where antiretroviral treatment (ART) has been shown to reduce the risk of HIV transmission by up to 96% (16) VCT is a crucial link for individuals with HIV infection to treatment, care and support, and promotes the safer behavior (use of condoms) among both HIV-positive and HIV-negative individuals (16).

1.3 HIV/AIDS and the use of VCT among MSM

Meta-analysis showed that HIV infection among MSM are 19.3 time higher in low and middle income countries than the general population (17). In Asia, MSM are 18.7 times more likely to be infected with HIV than the general population (17). MSM are not only at a high risk of getting HIV infection, but of suffering stigma and discrimination in day-to-day life (18). Increasing reports also suggest that discrimination, harassment, family disapproval,

social isolation and violence seriously affect the ability of MSM to access intervention, including VCT (19). In Nepal, male-male sexual behavior is highly stigmatized, which renders them hidden, marginalized and underserved; utilization of VCT among them is lower than 50% (20). Stigma against Nepalese MSM lead to practice high risk behavior with low levels of condom use, and a high number of both male and female partners. It is difficult for them to maintain safer sex due to existing discriminatory social, cultural and legal barriers.

1.4 The HIV epidemic and MSM in Nepal

In Nepal, the first case of HIV infection was reported in 1988 (4). In 2012, 50,200 people were estimated to be living with HIV, 90% of the infections being acquired through sexual transmission (21, 22). The HIV epidemic has moved from a low to a concentrated epidemic among identified key populations: MSM, people who inject drugs, female sex workers, and male labor migrants, particularly those coming from high HIV prevalence areas in India. The prevalence is higher among vulnerable populations (people who inject drugs=6%, MSM=4%, male labor migrants=2% and FSWs=2.2% in 2010) compared to the general population figure of <0.5% (20).

In every society, sexuality is a mixture of heterosexual and homosexual behavior. However, the prevalence and acceptance of homosexuality differs from place to place (23). In Nepal, sex between men is highly stigmatized and experience of discrimination, violence and rejection is common for them (24). The risk of becoming HIV infected is 9.2 times higher among Nepalese MSM than for general adult population (25), and the prevalence of HIV is rising from 3.3% in 2007 to 6.3% in 2012 among them(24). In 2012, an integrated biological and behavioural surveillance (IBBS), which used a respondent-driven sampling technique to recruit MSM, use of VCT in the past 12 months among MSM was only 45% in the capital city of Nepal (23).

2. Rational of study

HIV prevalence is declining among most of the population, except in MSM. Due to high social stigma and discrimination, most of MSM are hidden and underserved in Nepal. Considering increasing HIV prevalence and the higher level of unsafe anal sex among Nepalese MSM (26), identification of determinants of the use of VCT among them has both policy and programmatic implications. This is the first study that has used primary data from a survey among MSM in 15 geographically scattered districts of Nepal; it aims to address this

gap and to provide information that addresses some of the barriers for VCT utilization and identify possible social structure, health beliefs and enabling factors which indicate inequities in access. The Anderson's model of health care utilization was used as the conceptual framework towards a better understanding of the determinants of their utilization of VCT.

3. Overall Aim

3.1 General objective

The general objective of this study is to understand determinants of VCT uptake among MSM in Nepal

3.2 Specific objectives

- ✓ To examine the association between demographic factors and whether there has ever been use of VCT services among individual MSM.
- ✓ To examine the association between social factors and health beliefs, relating to the first objective
- ✓ To examine the association between potential enabling factors and ever use of VCT services.
- ✓ To examine the association between need factors and ever use of VCT services..
- ✓ To examine the association between health system factors and ever use of VCT services.

4. Methods:

4.1 Study Area:

The study explored 15 districts of Nepal (Figure 1).

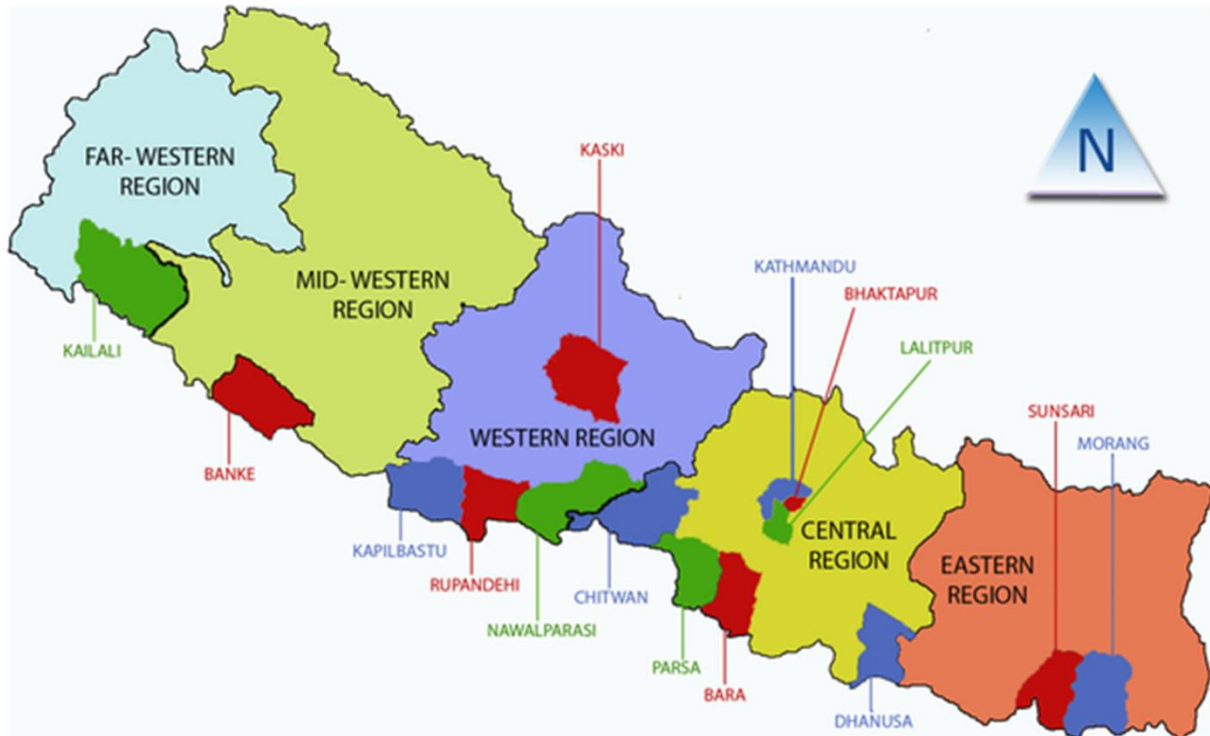


Figure 1 Study Districts (26)

4.2 Study population

The study population was MSM, who identified themselves as gay, homosexual or bisexual. Participants were eligible for the study if they were over 15 years of age and had had anal sex with another man in the past 12 months.

4.3 Sampling and Recruitment

Outreach workers (peer educators) functioning with MSM non-governmental organizations (NGOs) were used to recruit 339 participants between September and November, 2010. Of a

total of 75 districts in Nepal, 15 districts were purposively selected (Figure1) after discussion with the Blue Diamond Society (BDS), an NGO working for sexual and gender minority rights. The main criteria for selecting these 15 districts where the BDS was implementing their services, places where there will be a greater flow of MSM. The snowball sampling technique was used to find those MSM who were harder to reach by contacting the network of, initially, 2-3 participants in each district. Data was collected using face-to-face interviews.

4.4 Study design

This study was descriptively cross-sectional in design. To ensure acceptability of a semi-structured questionnaire, pilot testing has been done with 6 MSM within the Kathmandu valley. The questionnaire and informed consent forms were translated into Nepali and back-translated into English. The data was collected in 2010 by trained undergraduate public health students.

Register data was collected in 2014 on the availability of VCT and drop-in centers for MSM in 2010 the number of MSM who used the drop-in center and met outreach worker in the surveyed in the 15 districts. This data was collected from the Ministry of Health and branches of BDS in Nepal that have such drop-in centers.

4.5 Conceptual framework and study variables:

Andersen's Behavioural Model Phase 2 (27) was used as a conceptual framework for the study to examine the determinants of VCT utilization. This Model highlighted the importance of different factors — called need, enabling, predisposing and health care system — in the use of the health services. The main aim of Andersen behavioral Model is to know which factor are most fundamental to the utilization of health services which promote quality of life and prevention, treatment and management of diseases.

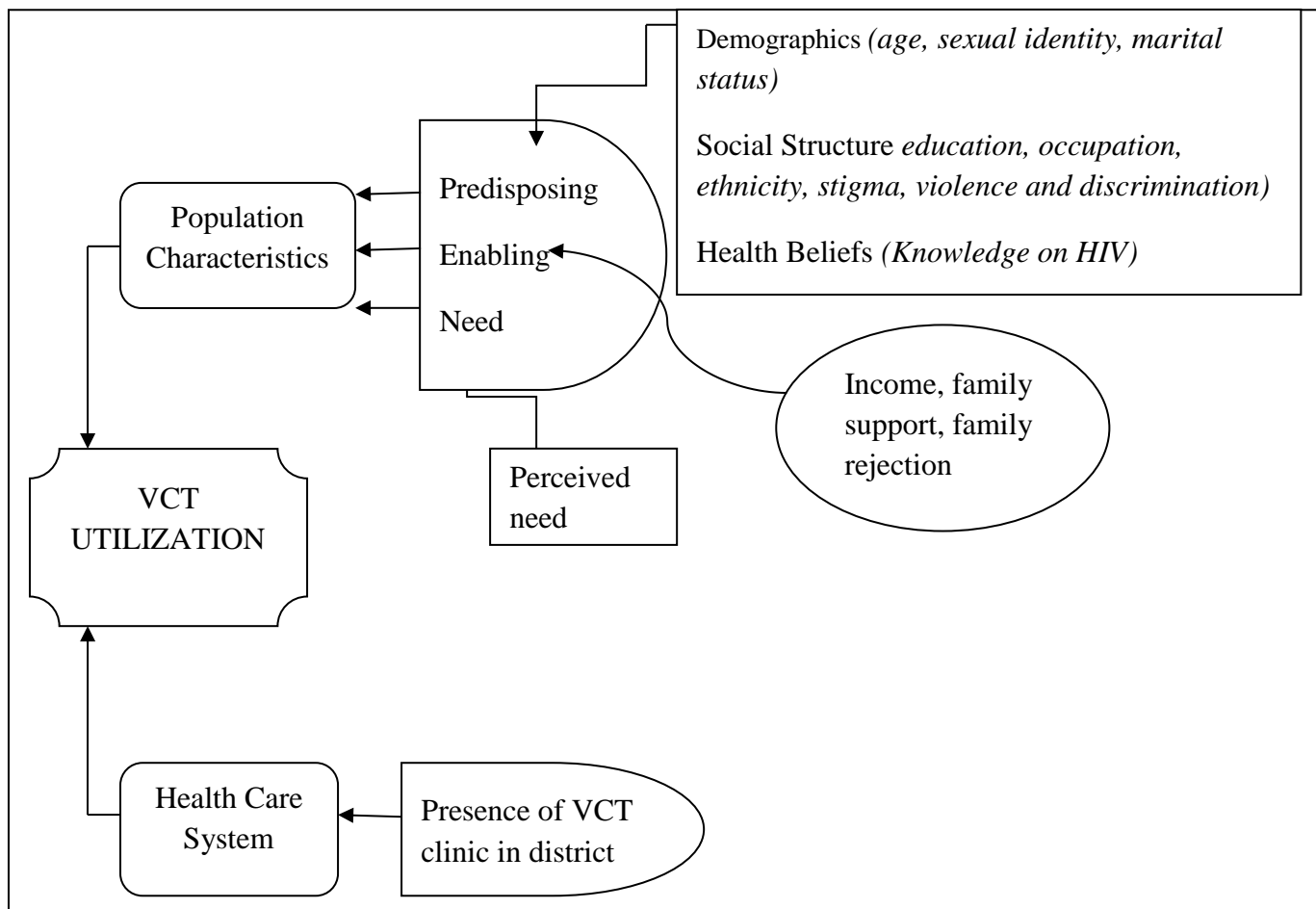


Figure 2 Conceptual Framework

Andersen described 3 components that influence health-seeking behaviour of the people (28). Predisposing Factors are demographic and social characteristics, and health beliefs. Age, education, occupation, etc., are some of these demographic factors. Social structure describes individual status and capacity to handle problems, like discrimination and violence among sexual minorities. Health belief factors basically measure the individual knowledge of and attitude to a disease like HIV/AIDS, and of the health services (29). Enabling factors refers to different resources available in society. Income, family support, rejection, etc., are such some of these, which may help the individual to access VCT. Need factors refers to the need for VCT that individual and health provider perceived. ‘Condom use during last intercourse’, self-perceived risk of HIV, and urethral discharge or genital ulcer in last 12 months, etc., may be such determinants that influence the use of VCT services. The presence of a VCT clinic in

the district was the only factor that facilitates access of individuals to VCT services. According to Andersen initial measures, inequitable access is a measure of the help of social structure, health belief and enabling resources.

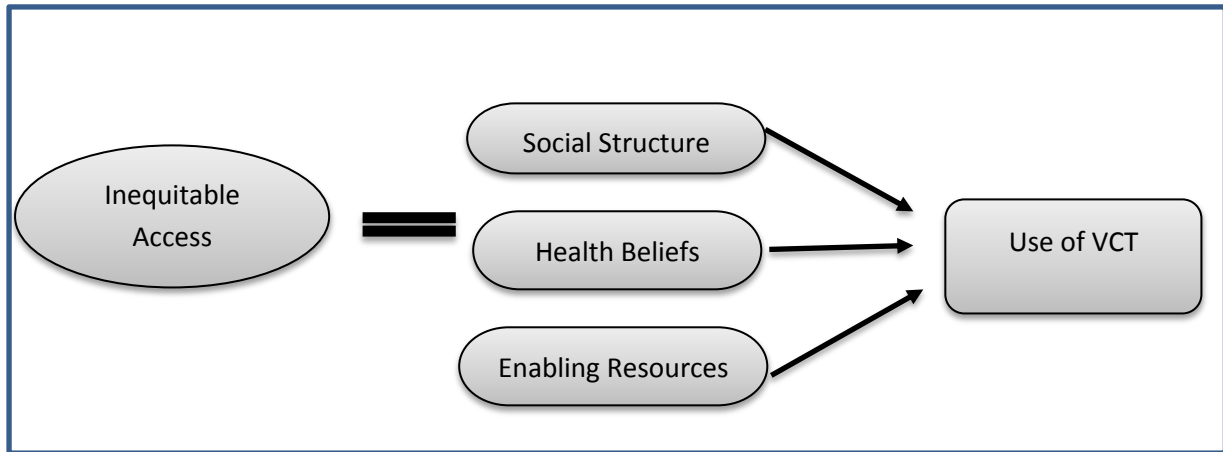


Figure 3: Measures of Access of VCT

Andersen's Behavioral Model aims to measure access to health care services (VCT). According to Andersen inequitable access occurs when different factors, such as social structure (eg. ethnicity), health beliefs and enabling resources (e.g. income) predominate.

Dependent variable: The dependent variable is whether the individual has ever used VCT, as assessed by the following question:

“Have you ever used VCT services?” (Yes vs. No) in which every participant responded, and none of the respondent responses indicated that they did not know about VCT services.

Independent variables:

The following independent factors were analyzed:

Demographic factors: age, sexual orientation, marital status

Social structure factors: education, occupation, caste, stigma, violence and discrimination
(forced by family to live outside of home and to marry women)

Health Belief factors: knowledge of HIV,

Enabling resources: income, family acceptance of sexual orientation, number of people providing support, care, encouragement and advice when a respondent became mentally distressed, or was sick and feeling low.

Need factors: condom use, number of partners (regular and casual), alcohol and drug use, self-perceived risk of HIV, urethral discharge and/or genital ulcer in last 12 months.

Health system factors: the presence of a VCT clinic in the districts was taken as a health system factor.

4.6 Statistical analysis

The survey data was entered into EpiData 3.02 version and exported to SPSS (version 17.0) for statistical analysis. Data on the presence of VCT sites was entered in SPSS. Data was summarized using frequencies, proportions, mean and medians with 95% confidence intervals (CI).

Bivariate associations between each independent variable and utilization of VCT were calculated using binary logistic regression (and presented as crude odds ratio with 95% CIs). We ran separate multivariate logistic regression models for each of the following types of factors: predisposing factors, enabling factors and need factors. Finally, we included all the variables that were significantly associated ($p < 0.05$) with VCT use in these separate models in a full multivariate model to determine which of the factors were the strongest predictors of VCT use. The analyses were adjusted in SPSS for clustering of observations.

4.7 Ethical consideration

Ethical clearance was obtained from Nepal Health Research Council (NHRC). Oral informed consent was given by all study participants. NHRC was aware that minors would be enrolled in this study ($\text{age} \leq 18$ years). Due to existing social stigma against homosexual behavior in Nepal, NHRC approved of interviewing minors without parental consent. The participation was voluntary and participants were told that they could refuse or opt out at any time. No personal identifier was recorded to ensure confidentiality and privacy was maintained by conducting interviews in a private room. Participants were not given any compensation for participating in the study.

5. Results

5.1 Participants' characteristics

As none of the participants refused to respond, the response rate was 100%. Among 339 participants, (central region-106, western region-86, eastern region-54, mid-western region-48, and far-western region-45) the mean age was 27, with respondents aged 15-24 constituting 43%, and those aged ≥ 25 years were 57%. Almost half of the respondents (46%) were married and 57% identified themselves as a meti, i.e. a feminine-appearing man, followed by bisexual, ta men (insertive sex role), homosexual/gay. About 11% of the respondents had had primary education, 69% had had secondary education, and only 7% had had tertiary education. One-third of respondents reported that their occupation as on a non-profit company staff, i.e. working in non-governmental organizations, 15% reported being students, and 2% were drivers, or members of the police or army. The respondents had different castes, majority of them being of middle caste (Janjati/Newar: 56%), followed by higher caste (Chhetri/Brahmin: 31%), with 11% belonging to the lower caste (11%). Nearly 60% of the respondents were not accepted by their family for their sexual identity, and 24% respondents had experienced discrimination at health centers or clinics. Among the total respondents, 87% reported that they had ever been to VCT (*Supplementary table 1*).

5.2 Predisposing Factors

In the multivariate analyses, occupation was significantly associated with ever having used VCT. Unemployed MSM had 63% lower odds of ever having used VCT services. In bivariate analysis, MSM with no formal education and belonged to the middle caste had 59% and 61% lower odds of ever having used VCT services, respectively. In bivariate analyses, the feminine appearance MSM had a 2 times higher odds of ever having used VCT services than those of masculine appearance MSM. Conversely, there was no significant association in multivariate analysis (Table 1).

Table 1. Utilization of VCT in relation to Predisposing Factors

Predisposing factors	Ever been to VCT; N (%)	Bivariate Analysis; Odds Ratio (95% CI)	Multivariable analysis; OR(95% CI)
Age (years)			
15-24	147(87.1)	Ref.	
25 and above	192 (86.9)	0.99 (0.41-2.40)	
Sexual Orientation			
Feminine appearing MSM	175 (59)	2.10 (1.10-4.08)	2.14 (0.78-5.89)
Masculine appearing MSM	120 (41)	Ref	Ref
Marital Status			
Married	156 (85.8)	Ref.	
Unmarried	183 (87.9)	1.20 (0.64-2.27)	
Education			
Formal Education	292 (88.6)	Ref.	Ref.
No formal Education	47 (76.5)	0.41 (0.19-0.89)	0.21(0.04-1.15)
Occupation			
Unemployed	67 (80.5)	0.53 (0.26-1.08)	0.37 (0.18-0.77)
Employed	272 (88.6)	Ref.	Ref.
Caste			
Upper caste (Chhetri/Brahmin)	107 (92.5)	Ref.	Ref.
Middle caste (Janjati)	189 (83.0)	0.39 (0.17-0.89)	0.65 (0.07-6.38)
Lower caste (Dalit)	43 (90.6)	0.78 (0.22-2.76)	0.64 (0.16-2.48)
Forced by family to live outside of home			
No	268 (85.8)	Ref.	
Yes	71 (91.5)	1.79 (0.72-4.42)	
Forced by family to marry women			
No	133(79.6)	Ref.	Ref.
Yes	206(91.7)	2.83(0.82-9.71)	2.28(0.68-7.65)

5.3 Enabling Factor

In multivariate analysis, those MSM whose family did not accept their sexual orientation had 64% lower odds of ever having used VCT services. In bivariate analyses, enabling factors, such as the family acceptance of sexual orientation and receiving encouragement when feeling low, were significantly associated with ever having used VCT services. Most of the other enabling factors, such as income, respondent receiving support and advice when they feel mentally distressed and feel low, were not significantly associated with ever having used VCT services (Table 2).

Table 2 Utilization of VCT in relation to Potential Enabling Factors

Enabling Factor	Ever been to VCT N (%)	Bivariate Analysis; Odds Ratio (95% CI)	Multivariable analysis; OR (95% CI)
Income (Nepalese Ruppee)			
7149	144 (88.1)	Ref.	
≥7150	145 (90.3)	1.25 (0.70-2.23)	
Family acceptance of sexual orientation			
Yes	146 (93.1)	Ref.	Ref.
No	193 (82.3)	0.34 (0.16-0.72)	0.36 (0.16-0.79)
Number of people providing support when respondent mentally distress			
0	24 (79.1)	0.53 (0.21-1.37)	
≥1	315 (87.6)	Ref.	
Number of people providing care when respondent sick			
0	28 (75)	0.40 (0.95-1.72)	
≥1	311 (88.1)	Ref.	
Number of people giving encouragement when respondent feeling low			
0	26 (73)	0.36 (0.10-1.30)	0.42 (0.12-1.45)
≥1	313 (88.1)	Ref.	Ref.
Number of people providing advice when respondent feels low			
0	30 (76.6)	1.02 (0.42-2.47)	

≥ 1	309 (88.0)	Ref.
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5.4 Need Factors

In bivariate and multivariate analyses, respondents who had more than 2 casual male partners had 2 times higher odds of ever having used VCT services over MSM who had 1 casual male partner. In addition those who had used illicit drugs in their last sexual intercourse had 74% lower odds of ever having used VCT services than those who had not. On the other hand, those who had a condom rupture during their last anal sexual intercourse had 3 times higher odds of ever having used VCT services than those whose condom was intact.

Table 3 Utilization of VCT in relation to potential Need Factors

Need Factors	Ever been to VCT N (%)	Bivariate Analysis; Odds Ratio (95% CI)	Multivariable analysis; OR(95% CI)
Number of regular male partners in last 12 months			
≤ 1	57 (79.3)	Ref	
≥ 2	238 (80.7)	0.92 (0.46-1.84)	
Number of casual male partners in last 12 months			
≤ 1	80 (67)	Ref.	Ref.
≥ 2	215 (73)	2.45 (0.97-6.14)	2.64 (1.03-6.74)
Self-perceived HIV risk			
No risk	73 (84.8)	Ref	
Some or high risk	222 (88.4)	1.36 (0.64-2.86)	
Use of drugs during last sexual intercourse			
Yes	28 (67.8)	0.26 (0.11-0.66)	0.24 (0.10-0.58)
No	311 (88.7)	Ref.	Ref.
Condom rupture during last anal sexual intercourse			
	264 (84.8)	Ref.	Ref.
	75 (94.7)	3.17 (0.91-10.9)	2.94 (1.02-8.54)

No		
Yes		
Urethral discharge in last 12 months		
Yes	16 (87.5)	1.04 (0.26-4.15)
No	323 (86.9)	Ref.
Genital ulcer in last 12 months		
Yes	44 (90.9)	1.56 (0.35-6.92)
No	295 (86.4)	Ref.

5.5 Health Care System

In bivariate analysis, MSM had 31% lower odds of having ever used VCT services, but this association was not statistically significant in districts in which VCT was available.

Table 4 Utilization of VCT in relation to Health Care System

Health care system	Ever been to VCT N (%)	Bivariate Analysis; Odds Ratio (95% CI)
Presence of VCT center in district of residence		
Yes	223 (85.6)	Ref.
No	116 (89.6)	0.69 (0.32-1.51)

5.6 Final multivariate model

In the final multivariate model, MSM who were middle caste (*janjati*) and unemployed had lower odds of having ever used VCT services. MSM who were experiencing family rejection due to their same sex behavior had 66% lower odds of having ever used VCT services than those MSM whose sexual orientation was accepted by the family. Among need factors, MSM who used illicit drug during their last sex had 82% lower odds of ever having used VCT services than those respondents who did not. MSM who experienced condom rupture during

anal sex had 3 times higher odds of having ever used VCT service than those whose condom not ruptured. The lack of VCT services in districts of residence was associated with 56% lower odds of having ever used VCT services.

Table 5 Final Multivariate analyses factors predicting ever use of VCT.

Factors	Full multivariate Analysis; AOR(95% CI)
Predisposing Factors	
Sexual Orientation	
Feminine appearing MSM	1.35 (0.50-3.66)
Masculine appearing MSM	Ref.
Education	
Formal Education	Ref.
No formal Education	0.25 (0.05-1.16)
Occupation	
Unemployed	0.27 (0.10-0.72)
Employed	Ref.
Caste	
Upper Caste (Chhetri/Brahmin)	Ref.
Middle caste (Janjati)	0.24 (0.10-0.57)
Lower caste (Dalit)	0.38(0.04-3.69)
Forced by family to marry women	
No	Ref.
Yes	2.24 (0.69-7.22)
Enabling Factors	
Family acceptance of sexual orientation	
Yes	Ref.
No	0.34 (0.16-0.73)
Number of people giving encouragement when respondent feeling low	
0	0.39 (0.05-2.17)
≥1	Ref.
Need Factors	
Number of casual male partner in last 12 months	
≤1	Ref.
≥2	1.75(0.66-4.63)
Use of illicit drugs during last sexual intercourse	

Yes	0.18(0.07-0.48)
No	Ref.
Condom rupture during last anal sexual intercourse	
No	Ref.
Yes	3.19(1.19-8.51)
Health care system	
Presence of VCT center in district of residence	
Yes	Ref.
No	0.44(0.29-0.66)

6. Discussion

This is the first study which has assessed determinants of VCT uptake among MSM in a number of districts within Nepal. The overall prevalence of ever having used VCT was found to be high, at 87%. Different factors such as MSM who were unemployed, belonging to middle caste, not having family acceptance of homosexual behavior, and using illicit drugs act, as barriers to use of VCT. This study also confirms that the lack of VCT services in residence districts of MSM also act as a barrier for ever having used VCT. The encouraging finding was that those MSM who were at high risk of HIV due to condom rupture during anal sex were more likely to ever having used VCT.

The prevalence of higher use of VCT among MSM is not consistent with findings of other studies, which found lower use of VCT (45%) among MSM in the capital city of Nepal (26). The main reason for such inconsistent findings is probably that this study enrolled most of the ‘seeds’ for the snowball-sampling technique from the non-governmental organizations which works for reproductive health rights for sexual minorities in Nepal. Most of the ‘seeds’ also work as a peer and outreach educator of such organizations. We hypothesize that recruitment from these ‘seeds’ might have influenced the enrollment of a high proportion of those MSM who were aware of available interventions, such as VCT. This might have led to overestimation of prevalence of ever having used VCT among MSM in this study.

The predisposing factor of unemployment was associated with lower odds of having ever used VCT services among MSM. It has been widely documented that unemployment, which is a strong predictor of no income, is strongly associated with the less likely use of health facilities. Although VCT service is free in Nepal, unemployed MSM may not have access to or can afford transportation for taking a test. Similarly, MSM belonging to the *Janjati* (middle) caste were also less likely to use VCT services. The literacy rate in Nepal differed among three castes; however, a separate study found that middle caste and lower caste adult literacy rate is 35% and 33%, respectively (30). This might be the reason that MSM belonging to middle and lower caste are less aware of the HIV test. They often avoid using modern medicine because of their widespread belief that it is expensive (30). It has been reported that alternative (ayurvedic) and self-medication (shaman healers) were common in some minority castes in Nepal (31). While implementing interventions such as VCT, self-medication related to culture that is enrooted in some minority caste needs to be addressed, otherwise this may act as a barrier to the use of health services even after the symptoms of sexually transmitted

infection are manifest. This study reveals that only middle caste people did not seek VCT services but no significant associations was found for lower caste. Because lower caste respondents were fewer in number which might affect the power to detect any associations.

Our findings suggest that lack of family acceptance of same-sex sexual behavior is associated with less likely to ever having used VCT services among MSM. From American cities (Chicago, Los Angeles, San Francisco and New York), it was found in 2001 that securing support from an immediate family member about homosexuality is important to most of MSM (32). The lack of family support probably deeply troubles MSM emotional life, which might affect their health seeking behavior. In addition, in some countries experience of different forms of abuse among MSM, and limiting their freedom, hinder their seeking behavior care (33). But in Nepal, specific sub-groups of MSM, such as *meti*, i.e. transgender, are more likely to experience family rejection. The majority of the Nepalese (>80%) practice the Hindu religion, in which the role of the son is critical in the family to act as a savior. This is because he is the authorized person in the family who can perform important ritual activities, such as '*Daag Batti*' (the belief that a person's soul will reach heaven only when he lights the funeral pyre) and '*Pinda Daan*' (the belief that if the son collects the ashes of a deceased parent and washes them in the Ganges, the soul achieves salvation). These religious acts are only performed by son, and in a Hindu society of Nepal, it is difficult to understand and accept a male behaving as a girl. Indeed, they think that they do not fit into conventional gender categories. This is one of the reasons MSM - especially those who have feminine behavior (transgender or *meti* in Nepal) - experience family rejection, discrimination and violence.

Need factors, like the use of illicit drug use, are negatively associated with ever having used VCT. Conversely, other studies from Kenya and Thailand found that the use of illicit drug is positively associated with VCT use (34, 35). The differences in findings might be due to different cultural context and accessibility of VCT services (34, 35). Lack of VCT services in residential districts was also an independent predictor of the less likely use of VCT services among MSM. The number of VCT centers managed in different districts by MSM-led community organizations did not change during the period of study. However, over this time, targeted VCT centers (among other key populations at risk, such as people who inject drugs, migrants, and sex workers) have expanded throughout the country. There are currently over 200 VCT centers in Nepal managed by both government and private NGOs. Although the situation changes with time, shrinking donor support always challenges the equitable

distribution of VCT services in a resource-limited setting like Nepal. It has been frequently reported that the discontinuation of external donor support interrupts the expansion and continuation of VCT services in Nepal. This study findings suggests that inequity exists whereby the ability to access VCT service varies according to caste, family acceptance of sexual orientation and residential districts.

This study had several methodological limitations. First, the non-probability sampling techniques (snowball) used to recruit study respondents might increase the possibility that those who participated in study differ systematically in VCT use compared to those who were never peer recruited. We over-represented those MSM who were closely associated with NGOs working for the sexual and reproductive health rights of sexual minorities in Nepal which might affect the generalizability of this study finding. This might probably overestimate the ever having used VCT numbers among MSM in this study. Some efforts were made to minimize participation bias by recruiting a wider characteristic of seeds (MSM who are involve in sex work, young vs. old etc.).

Second, self-reported risk behavior may be prone to social desirability bias. However, we attempted to minimize this bias by ensuring study respondents of the confidentiality of their responses and lack of use of any personal identifiers.

Third, almost all variables in the questionnaire were designed to assess the respondents past exposure or experiences (number of casual and steady partners in last 12 months), which may increase the risk of recall bias. Fourth, this study is cross-sectional in design, which limits causal inference by default.

The strength of the study is that it is the first study to provide data on MSM living in the geographically scattered 15 districts including situation regarding VCT uptake and its different determinants, which will greatly help to design and study health-seeking behavior of Nepalese MSM in geographically scattered districts in future. Another important limitation is that this study did not capture the extent and frequency of recent HIV testing behaviors (for example, in the last 12 months), which might be interesting in understanding VCT use among MSM practicing high risk behaviors (high number of sexual partners with unsafe anal sex).

In conclusion, this survey indicates that access to VCT is good among MSM closely associated with NGOs. The finding suggests that VCT get hold of those MSM who are at high risk of HIV through condom rupture, but inequitable geographical distribution of VCT (most

are concentrated in urban areas) obstructs the uptake of VCT among MSM. Efforts to increase VCT use among Nepalese MSM of different ethnicity and economic status need to be targeted. A more holistic approach that includes efforts to address lack of family acceptance and use of illicit drugs among MSM is required to increase uptake of VCT among MSM in Nepal.

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Supplementary Table 1: Socio-Demographic Characteristics surveyed among MSM in**Nepal**

Socio Demographic Characteristics	N	%
Age		
15-20	34	10
20-24	113	33
25-29	80	24
30-34	46	14
35-39	31	9
40 and above	35	10
Sexual Identity		
Bisexual	40	12
Ta	31	9
Men	30	9
Homosexual	26	8
Gay	19	6
Meta/meti	193	57
Marital Status		
Married	156	46
Unmarried	183	54
Education		
Illiterate	47	14
Primary	36	11
Lower Secondary	97	29
Higher Secondary	135	40
Bachelor and above	24	7
Occupation		
Student	51	15
Driver	2	0.6
Police army	1	0.3
civil servant	1	0.3
Businessman	17	5
Private staff	87	26
Unemployed	16	5
Wage labourer	37	11
Caste		
Brahmin	38	11
Chettri	69	20
Newar	30	9
Dalit	36	11
Janjati	159	47
others	7	2