

Study on Influencing Factors to HIV Health Services Among Men Who Have Sex with Men (MSM) from 2013 to 2021

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Research

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Abstract

Background We assessed the utilization of HIV health services and its influencing factors on consistent condom use, HIV testing and HIV counseling among men who have sex with men (MSM) based on Andersen Behavioral Model, so as to provide a theoretical basis for future infectious disease prevention and control strategies and health services policy formulation.

method This is a cross-sectional study from 2013 to 2021. A sample survey was conducted in southwest China including Chongqing, Sichuan, Xinjiang and Guangxi, and an anonymous self-administered questionnaire survey was conducted among MSM who met the requirements and were recruited. Based on Anderson Behavioral Model, the questionnaire divided the influencing factors into predisposing factor, enabling factor and need factor. There were 2908 valid questionnaires. Multivariate logistic regression analysis was used to explore the factors influencing the utilization of health services.

Results In the survey of HIV health services, 36.49% of respondents consistently used condoms, 82.81% had HIV testing, and 65.61% had HIV counseling. It can be obtained that among the predisposing factor, older age is a factor that promotes HIV testing but is a hindrance to consistent condom use. Condom use was higher among MSM who were Ethnic Han and had an education level of "junior high or below". Among the enabling factor, not finding a sexual partner through the Internet, not having commercial sex were associated with consistent condom use. Urban and high income were enablers of HIV testing and HIV counseling. Among the need factor, improved HIV knowledge could promote HIV testing and HIV counseling among MSM.

Conclusions For these groups, MSM with high-risk characteristics should be identified as a priority in the future public health services. HIV knowledge should be promoted in health education, and mental health diagnosis and treatment also should be strengthened.

Introduction

As a chronic infectious disease, AIDS has seriously affected the development of global public health undertakings. At the same time, the number of AIDS-related deaths is far higher than that of other infectious diseases[1], which is a threat to public health and quality of life. In recent years, the AIDS epidemic in China has grown rapidly, from 440,000 in 2011 to 950,000 in 2019[2]. Among them, MSM is the main key population of HIV infection. Homosexual transmission has become the second most common HIV transmission route after heterosexual transmission, accounting for about a quarter of new HIV cases. Despite some success in HIV prevention efforts, the rate of HIV transmission among MSM population still remains high[3]. Therefore, it is very important to pay attention to the need and utilization of health services for this population.

Health services mainly refer to medical treatment, prevention, health care, rehabilitation and other activities provided to residents by the health system with certain health resources, including prevention and control of infectious diseases[4], disease screening[5] and disease surveillance[6]. Among them, HIV-

related health services mainly include: HIV testing, HIV counseling, condom use and so on. As early as the beginning of the 21st century, existing countries recognized the importance of strengthening public health services to combat infectious diseases and conducted continuous research and improvement[7]. A Canadian study found that the private health services of HIV counselling and point-of-care (POC) testing based on urban communities were acceptable and feasible to a certain extent[8]. In addition, the Internet can be used as a potential point of access to health screening to address inequalities in health services, according to a US online survey[9]. And some Chinese scholars also have integrated the newly developed M-Health app with HIV health services to prevent disease transmission and reduce HIV infection rate.

In health services, the priority groups often focus on: adolescents[10], mothers and children[11], migrants[12], female sex workers[13], etc. MSM, as a special population, has been largely ignored by health service projects[9]. In areas with laws and policies forbidden, some key population is more difficult to access them[10]. However, reasonable evaluation of acquisition and quality of health services can help reduce disparities and health care inequalities in MSM and other sexual minorities populations[9]. Future research should also give priority to a gender-specific organizational framework to understand and address the complex situation of limited MSM access to HIV health services.

Several studies have shown that social structure, psychological factors, stigma, homophobia, and policy issues can all affect MSM engagement and positivity in HIV health services[14]. There is also evidence that MSM have been rejected by family members, publicly humiliated and laughed by health care workers when they disclose their sexual orientation[15]. Because of the stigma and discrimination from health providers and neglect by health systems, it poses a significant challenge to HIV care and treatment for this population.

Therefore, based on Anderson Behavioral Model, this paper takes consistent condom use, HIV testing and HIV counseling as health services utilization items, and discusses the utilization and influencing factors of health services for MSM. The 8-year investigation of HIV health services ensured the continuity of research. Priority should be given to the identification of high-risk characteristics of this population, and intervention or further research should be conducted to improve the utilization of HIV health services and reduce the incidence of new infections, and to provide more new ideas for future service supply strategies.

Methods

Participants and procedures

This study is a cross-sectional study. From 2013 to 2021, in four regions of outwest China, including Chongqing, Sichuan, Xinjiang and Guangxi, qualified subjects were first sought through advertisements on gay websites and QQ groups, and then more people were recruited through "snowball" sampling. Inclusion criteria include :(1) signing of informed consent. (2) Age \geq 18 years and \leq 65. (3) Having at least

one same-sex partner and having sex at least once. The method of anonymous self-filling questionnaire was adopted, which was collected on the spot and checked for completeness and logic.

Measures

Definitions of HIV health services

HIV health services in this study include: consistent condom use, HIV testing and HIV counseling. Consistent condom use is defined as the use of condom every time including anal and oral sex. The project measured the number of times respondents had inserted sex and the number of times they used condoms during sex. HIV testing refers to whether the respondents had been tested for HIV, and they chose "yes" or "no". HIV counselling refers to whether the respondents have had AIDS-related counselling, and they choose "yes" or "no".

Andersen Behavioral Model

The Anderson Behavioral Model chosen for this study was originally developed in the 20th century to describe the factors that influence the use of health services^[16]. Has been used to guide the examination of predictors associated with a variety of health outcomes, such as drug use among people living with HIV^[17]. The model has been widely used in hypertension disease management^[9], women's mental health^[18], breast cancer screening^[19, 20], etc. Taking Anderson Behavioral Model as the theoretical basis and incorporating it into the analysis of influencing factors can better explain and understand the influence of variables on outcome indicators, and can also better clarify the context of health services, so as to provide targeted suggestions for future policy making.

The model divided the influencing factors into: predisposing factor, enabling factor and need factor. Predisposing factor refers to an individual's unchangeable nature, including demographic variables and social structural variables^[21]. Age, nationality, degree of education, employment and sexual role are included into this factor. Enabling factor refers to that can promote or hinder the use of services, including personal resources and regional health services resources^[21]. Household registration, income, marriage, find sexual partners through the Internet and commercial sexual service are included into this factor. Need factor refers to the subjective understanding of the disease and clinical objective diagnosis results^[21]. HIV knowledge, diagnosis of sexually transmitted disease (STD) are included into this factor. A diagram of the theoretical framework of Anderson Behavioral Model is shown in Figure 1.

HIV knowledge score

In the basic information, the HIV knowledge scale (Cronbach's alpha = 0.672) was made up of 13 questions based on a revision of the International AIDS Knowledge Survey General Scale^[22]. The answers include "true", "false" and "don't know". Based on the answers, there is a 1 point for correct answers, and 0 points for incorrect or unknown answers. The higher score is, the more knowledge the respondents had about HIV. We consider that the score ≥ 11 indicates a good level of HIV knowledge. (Table 1)

Table 1

International AIDS Knowledge Survey General scale (Cronbach's alpha = 0.672)

Items	
(1)	If I eat with HIV-infected people, I will be infected with AIDS
(2)	If I share needles with drug addicts, I will be infected with AIDS
(3)	If I practice oral sex without condoms, I will be infected with HIV
(4)	AIDS cannot be cured
(5)	Mosquito bites can transmit AIDS
(6)	If I use condoms correctly at each insertion, I can avoid HIV infection
(7)	Removal of the penis from the vagina or anus before ejaculation can prevent HIV infection
(8)	Being with only one uninfected loyal partner can prevent HIV infection
(9)	All HIV-infected pregnant women give birth to HIV-infected children
(10)	People who use antibiotics are not infected
(11)	Examination results at 1 week after sexual intercourse can determine whether the person is infected with HIV
(12)	Oral sex is much less likely to transmit HIV than anal intercourse
(13)	The risk of HIV infection can be reduced by the treatment of sexually transmitted diseases

Statistical analysis

The variables in the questionnaire were classified and described, and then univariate differences were analyzed by Chi-square test according to the outcome variables of health services: consistent condom use, HIV testing and HIV counseling. The variables with $p \leq 0.15$ was screened and included into the multivariate logistic regression model. Finally, the logistic regression models of consistent condom use, HIV testing and HIV counseling were established respectively. SAS 9.4 was used in both univariate and multivariate analyses. The missing data for all variables were < 5%.

Results

A total of 3053 questionnaires were collected from Chongqing, Sichuan, Xinjiang and Guangxi in this HIV health service survey. The questionnaires that didn't meet the requirements were excluded, including 6 questionnaires that did not complete HIV testing, 3 questionnaires not complete HIV counseling, 77 questionnaires not complete condom use, and 58 questionnaires not complete HIV knowledge score scale. A total of 2908 valid questionnaires met the requirements, with effective recovery of 95.25%.

In this health service survey, 36.49% of the respondents reported consistent condom use, 82.81% of the respondents received HIV testing, and 65.61% of the respondents received HIV counseling. According to the results of univariate analysis (Table 2), variables with $p \leq 0.15$ were included in the multivariate logistic regression model.

With "consistent condom use" as the dependent variable, age ($p=0.0020$), nationality ($p=0.0019$), degree of education ($p=0.0037$), household registration ($p=0.1083$), find sexual partners through the Internet ($p<0.0001$), and commercial sexual service ($p<0.0001$) were included in the multivariate logistic regression model.

With "HIV testing" as the dependent variable, age ($p<0.0001$), nationality ($p=0.0213$), degree of education ($P<0.0001$), employment ($p<0.0001$), sexual role ($p=0.0075$), household registration ($p<0.0001$), income ($p<0.0001$), find sexual partners through the Internet ($p=0.0498$), HIV knowledge ($p<0.0001$) were included in the multivariate logistic regression model.

With "HIV counseling" as the dependent variable, age ($p<0.0001$), degree of education ($p=0.0240$), employment ($p=0.0036$), household registration ($p<0.0001$), income ($p<0.0001$), find sexual partners through the Internet ($p=0.1283$), HIV knowledge ($p<0.0001$) and diagnosis of STD ($p=0.1476$) were included in the multivariate logistic regression model.

Table 2

Univariate analysis of consistent condom use, HIV testing, and HIV counseling based on Anderson Behavioral Model

Items	N (%)	Consistent condom use	HIV testing	HIV counseling
Predisposing factor				
Age		0.0020	<.0001	<.0001
18~25	304(10.45%)	137(45.07%)	226(74.34%)	179(58.88%)
25~35	1393(47.90%)	510(36.61%)	1135(81.48%)	869(62.38%)
≥35	1211(41.64%)	414(34.19%)	1047(86.46%)	860(71.02%)
Nationality		0.0019	0.0213	0.8096
Ethnic Han	2691(92.54%)	1003(37.27%)	2216(82.35%)	1764(65.55%)
Others	217(7.46%)	58(26.73%)	192(88.47%)	144(66.36%)
Degree of education		0.0037	<.0001	0.0240
Junior high or below	320(11.00%)	138(43.13%)	237(74.06%)	187(58.44%)
Senior high	701(24.11%)	278(39.66%)	559(79.74%)	455(64.91%)
Junior college	711(24.45%)	243(34.18%)	599(78.62%)	481(67.65%)
College or above	1176(40.44%)	402(34.18%)	1013(86.14%)	785(66.75%)
Employment		0.2962	<.0001	0.0036
Employed	2245(77.20%)	809(36.04%)	1911(85.12%)	1508(67.17%)
Retirement	37(1.27%)	18(48.65%)	30(81.08%)	25(67.57%)
Student	371(12.76%)	133(35.85%)	265(71.43%)	214(57.68%)
Unemployed	255(8.77%)	101(39.61%)	202(79.22%)	161(63.14%)
Sexual role		0.2958	0.0075	0.4617
Only "1"	828(28.47%)	324(39.13%)	699(84.42%)	561(67.75%)
Both, mainly "1"	576(19.81%)	194(33.68%)	494(85.76%)	381(66.15%)
Both of it	696(23.93%)	248(35.63%)	564(81.03%)	454(65.23%)
Both, mainly "0"	429(14.75%)	160(37.30%)	357(83.22%)	272(63.40%)
Only "0"	379(13.04%)	135(35.62%)	294(77.57%)	240(63.32%)
Enabling factor				
Household registration		0.1083	<.0001	<.0001
Urban	2034(69.94%)	723(35.55%)	1741(85.59%)	1392(68.44%)

Items	N (%)	Consistent condom use	HIV testing	HIV counseling
Rural	874(30.06%)	338(38.67%)	667(76.32%)	516(59.04%)
Income		0.5286	<.0001	<.0001
≤1000	399(13.72%)	146(36.59%)	285(71.43%)	233(58.40%)
1000~3000	846(29.09%)	302(35.70%)	671(79.31%)	520(61.47%)
3000~5000	972(33.43%)	345(35.49%)	823(84.67%)	671(69.03%)
>5000	691(23.76%)	268(38.78%)	629(91.03%)	484(70.04%)
Marriage		0.4870	0.4654	0.1904
Unmarried	2226(76.55%)	805(36.16%)	1848(83.06%)	1453(65.30%)
Married	435(14.96%)	159(36.55%)	350(80.46%)	281(64.60%)
Divorced	247(8.49%)	96(38.87%)	209(84.62%)	174(70.45%)
Find sexual partners through the Internet		<.0001	0.0498	0.1283
Frequently	209(7.19%)	55(26.32%)	176(84.21%)	138(66.03%)
Sometimes	489(16.82%)	130(26.58%)	425(86.91%)	341(69.73%)
Occasionally	1114(38.31%)	397(35.64%)	913(81.96%)	732(65.71%)
None	1096(37.69%)	479(43.70%)	894(81.57%)	697(63.59%)
Commercial sexual service		0.0063	0.3203	0.9461
Yes	153(5.26%)	40(26.14%)	82(82.00%)	100(65.36%)
No	2755(94.74%)	1021(37.06%)	1262(77.76%)	1808(65.63%)
Need factor				
HIV knowledge score		0.3831	<.0001	<.0001
≥11	1229(42.26%)	428(34.83%)	1138(92.60%)	938(76.32%)
<11	1679(57.74%)	633(37.70%)	1270(75.64%)	970(57.77%)
Diagnosis of STD		0.3831	0.1641	0.1476
Yes	205(7.05%)	69(33.66%)	177(86.34)	144(70.24%)
No	2703(92.95%)	992(36.70%)	2231(82.54%)	1764(65.26%)

According to multivariate logistic regression analysis, MSM aged 18-25 were more likely to use condoms consistently than aged ≥ 35 (OR=1.681, 95%CI: 1.295 to 2.182, $p=0.0004$). Ethnic Han was a factor promoting continuous condom use (OR=1.582, 95%CI: 1.154 to 2.170, $p=0.0044$). Compared with "College or above", MSM with "Junior high or below" educational level was more likely to use condoms consistently (OR=1.535, 95%CI: 1.182 to 1.994, $p=0.0057$). Not finding a sexual partner through the Internet (OR=2.011, 95%CI: 1.440 to 2.810, $p<0.0001$), not having commercial sex (OR=1.622, 95%CI: 1.109 to 2.373, $p=0.0127$) were associated with consistent condom use. (Table 3)

It is more likely to be tested for HIV with older age (OR=1.790, 95%CI: 1.288 to 2.489, $p=0.0002$). Urban (OR=1.356, 95%CI: 1.096 to 1.676, $p=0.0050$) and high income (1000~3000 vs. ≥ 1000 : OR=1.489, 95%CI: 1.116 to 1.987, $p=0.0351$; >5000 vs. ≥ 1000 : OR=3.358, 95%CI: 2.360 to 4.776, $p<0.0001$) are the facilitators to HIV testing. Increasing HIV knowledge (OR=3.752, 95%CI: 2.934 to 4.797, $p<0.0001$) can promote HIV testing. (Table 4)

Urban (OR=1.222, 95%CI: 1.028 to 1.454, $p=0.0231$) and high income (3000~5000 vs. ≥ 1000 : OR=1.415, 95%CI: 1.101 to 1.819, $p=0.0139$; >5000 vs. ≥ 1000 : OR=1.387, 95%CI: 1.062 to 1.810, $p=0.0452$) also are the facilitators to HIV counseling. In the meanwhile, increasing HIV knowledge (OR=2.283, 95%CI: 1.933 to 2.696, $p<0.0001$) can also promote counseling. (Table 5)

Table 3

Multivariate logistic regression analysis of consistent condom use among MSM based on Anderson behavioral Model

Variables	b	S	Wald χ^2	p value	OR (95%CI)
Predisposing factor					
Age					
18~25	0.2936	0.0833	12.4351	0.0004	1.681(1.295 to 2.182)
25~35	-0.0679	0.0588	1.3313	0.2486	1.171(0.991 to 1.384)
≥35	Reference	-	-	-	-
Nationality					
Ethnic Han	0.2294	0.0806	8.1030	0.0044	1.582(1.154 to 2.170)
Others	Reference	-	-	-	-
Degree of education					
Junior high or below	0.2580	0.0932	7.6564	0.0057	1.535(1.182 to 1.994)
Senior high	0.0654	0.0704	0.8623	0.3531	1.266(1.038 to 1.544)
Junior college	-0.1528	0.0714	4.5793	0.0324	1.018(0.834 to 1.243)
College or above	Reference	-	-	-	-
Enabling factor					
Find sexual partners through the Internet					
Frequently	Reference	-	-	-	-
Sometimes	-0.0261	0.0897	10.8946	0.0010	0.962(0.663 to 1.394)
Occasionally	0.1110	0.0680	2.6081	0.1063	1.445(1.033 to 2.021)
None	0.4419	0.0680	42.2048	<.0001	2.011(1.440 to 2.810)
Commercial sexual service					

Variables	b	S	Wald χ^2	p value	OR (95%CI)
Yes	Reference	-	-	-	-
No	0.2418	0.0970	6.2089	0.0127	1.622(1.109 to 2.373)

Table 4

Multivariate logistic regression analysis of HIV testing among MSM based on Anderson behavioral Model

Variables	b	S	Wald χ^2	p value	OR (95%CI)
Predisposing factor					
Age					
18~25	Reference	-	-	-	-
25~35	-0.0125	0.0728	0.0301	0.8623	1.131(0.964 to 1.789)
≥ 35	0.2975	0.0801	13.7955	0.0002	1.790(1.288 to 2.489)
Enabling factor					
Household registration					
Urban	0.1521	0.0542	7.8759	0.0050	1.356(1.096 to 1.676)
Rural	Reference	-	-	-	-
Income					
≤ 1000	Reference	-	-	-	-
1000~3000	-0.1760	0.0835	4.4388	0.0351	1.489(1.116 to 1.987)
3000~5000	0.1137	0.0854	1.7713	0.1832	1.990(1.483 to 2.671)
>5000	0.6368	0.1109	32.9546	<.0001	3.358(2.360 to 4.776)
Need factor					
HIV knowledge score					
≥ 11	0.6611	0.0627	111.0949	<.0001	3.752(2.934 to 4.797)
<11	Reference	-	-	-	-

Table 5

Multivariate logistic regression analysis of HIV counseling among MSM based on Anderson behavioral Model

Variables	b	S	Wald χ^2	p value	OR (95%CI)
Enabling factor					
Household registration					
Urban	0.1004	0.0442	5.1644	0.0231	1.222(1.028 to 1.454)
Rural	Reference	-	-	-	-
Income					
≤1000	Reference	-	-	-	-
1000~3000	-0.1197	0.0668	3.2156	0.0729	1.067(0.830 to 1.372)
3000~5000	0.1626	0.0661	6.0554	0.0139	1.415(1.101 to 1.819)
>5000	0.1420	0.0740	3.6761	0.0452	1.387(1.062 to 1.810)
Need factor					
HIV knowledge score					
≥11	0.4127	0.0425	94.4341	<.0001	2.283(1.933 to 2.696)
<11	Reference	-	-	-	-

Discussion

Andersen’s model was adapted to identify factors associated with HIV health services by including sets of variables. The model helped uncover factors that may be ignored before, especially among MSM. Among the health services utilization projects examined in this study, the utilization of HIV counseling and HIV testing was good, but the status of consistent condom use was not optimistic, which is accordant with the description of Mengran[23]: a low level of intentions to use condoms consistently has been reported in Chinese MSM population.

According to the Anderson behavioral model, need factor reflects how people view their own health, subjective cognition of disease and clinical diagnosis for individual physical condition, is the most direct and important factor which influences health services utilization. Therefore, it is considered to be one of the powerful predictor in health services[24]. It can also be seen from this study that need factor is the main factor affecting HIV health services. Among them, HIV knowledge had statistically significant effects.

In the 2908 valid questionnaires collected this time, the average HIV knowledge score was 9.60 ± 2.50 , among which, ≥ 11 accounted for 42.26% and < 11 accounted for 57.74%, indicating that the degree of

HIV knowledge was generally moderate. HIV knowledge is the main factor affecting HIV testing and HIV counseling, which is also consistent with the research ideas of Sofia[25]. In fact, as early as 10 years ago, scholars proposed the Information, Motivation and Behavioral Skills (IMB) Model, which has guiding significance in HIV risk reduction interventions[26]. The information in the IMB model mainly includes subjective information and objective information, of which objective information includes knowledge[27]. More and more studies have found that HIV knowledge plays a key role in the prevention and control of AIDS. The studies of Simukai and Doris[28, 29] also indicated that HIV knowledge and attitude were associated with non-condom use and high-risk sexual behavior, so knowledge promotion and popularization based on media platforms were urgently needed. At the same time, Chilot[30] has pointed out that a very low comprehensive knowledge of HIV/AIDS is one of the major reasons for the increase of HIV infections.

It has been confirmed in the literature that educational programs[31], sexual education and communication activities[32] can contribute to the improvement of knowledge. However, it remains to be discussed whether increased HIV knowledge will necessarily lead to improved behavior, because of the phenomenon of "knowledge-practice separation". According to the theory of Knowledge, Attitude and Practice (KAP) and the study of Min-Jin Peng[33], we can see that the phenomenon of "knowledge-practice separation" does exist, and at the same time, improving self-efficacy may help to solve this problem. Therefore, in the future, more studies are needed to evaluate the HIV knowledge of high-risk groups and explore relevant influencing factors, so as to solve the problem of "knowledge-practice separation" or "knowledge-attitude separation" in this group for reducing the incidence of new HIV infection.

In addition to the above factors, other factors will also affect HIV health services. The enabling factor in the Anderson Behavioral Model refers to the resources or means by which an individual has access to health services, usually involving individual and community resources such as health insurance, income, wealth, availability of services and urban classes. User fees for healthcare services present a barrier to patients accessing healthcare and reduce detection of serious infectious diseases[34]. Because in China, HIV testing and counseling is free only in CDC, and in other institutions such as hospitals is charged. They are also not covered by medical insurance. At the same time, the location of HIV testing and counseling is only under some settings, which makes it easier for MSM living in urban areas to access health services. It is therefore proposed to increase the number of health service points in rural areas in order to address the uneven distribution of resources between regions.

In addition, the Internet has become popular in MSM as an online platform for seeking relationships and sexual partners, such as using social networks to date with other men. Previous studies have shown an association between finding sexual partners through the Internet and risky sexual behavior. It indicated that MSM who use the Internet to find sexual partners are more likely to engage in unprotected anal sex[35, 36], which is consistent with the results of our study. Nemoto's[36] research also suggests that sexual risk behavior may be related to psychosocial factors. Another aspect is commercial sex. Research figures that sexual partnerships and unprotected sex increase the likelihood of HIV/AIDS infection and

transmission in China, especially in the low-level commercial sex industry[37, 38]. Because the commercial sex is illegal in China, HIV prevention services are difficult for sex workers and their clients to access. The Chinese government should pay more attention to the dangerous environment of commercial sex in order to prevent the spread of AIDS. Internet usage and commercial sex, as a part of enabling factor, reflect more realistic social problems in health services. For a specific group like MSM, we recommend more public health campaigns in local communities and more HIV-related knowledge on social networking platforms. It is also beneficial to promote free condoms in rural areas and urban communities.

The third influencing factor in Anderson Behavioral Model is the predisposing factor, which refers to the nature of the individual that cannot be easily changed. Our study found that MSM with age (18-25) and lower educational attainment (junior high or below) were more likely to use condoms consistently. Although this is contrary to the findings of many studies[39–41], we considered that it might be related to increased risk perception in this population. Both a cross-sectional study[42] and a population-based longitudinal analysis[43] showed an association between risk perception and condom use. Also, the results of the Algarin's[44] study showed that people with high school or lower education were more likely to use condoms, similar to the results of our study. They propose that sociodemographic attributes (e.g., age, nationality, education) will influence condom use. Future knowledge-based HIV prevention interventions that are sensitive to different levels of education, age, and ethnic identity should consider recognizing the classification and describing its efficacy and when it is most appropriate to use it.

Of course, there are other problems in HIV health services, such as limited data[45], unreasonable organization of health institutions[46], and high cost (time cost and human resources) for a health service[2]. The need to combine medical, sociological and psychological considerations also poses a great challenge to the development of health services. Especially for MSM, it needs to be more cautious and careful. In this paper, a widely used and relatively mature theoretical model (Anderson Behavioral Model) is applied to HIV health services, and the 8-year health services survey also ensures the consistency and robustness of the study to better understand and explain the factors that influence health services. However, there are several problems as follows. (1) As a sensitive group, MSM pay great attention to privacy issues. As our survey was conducted in the form of face-to-face questionnaire, some sensitive issues (such as sexual behaviors, condom use, and sexual partners) may be concealed. In the future, more attention should be paid to privacy protection of sensitive groups. (2) There are only three health service utilization items included in the analysis, which may not necessarily representative of all health services. Because health services a complex phenomenon and has multiple dimensions of access outcomes. We hope that more studies will focus on the health services of this population in the future, investigate more needs and utilization, and provide new directions and ideas for AIDS prevention and policy making.

In conclusion, based on Anderson Behavioral Model, this paper studies the factors affecting HIV health services from 2013 to 2021. Finally, we conclude that MSM population has a good utilization of health services, but the consistent condom use is not ideal. HIV knowledge, household registration and income

are the main factor affecting HIV testing and HIV counseling. Younger and less educated MSM are more likely to use condoms consistently. Internet commercial sex use is associated with consistent condom use. Need factor is the main factor determining the utilization of HIV health services. The government and relevant departments should strengthen the popularization of disease knowledge and the diagnosis and treatment of individual physical and mental diseases. MSM population with high-risk characteristics should be identified as a priority in the future public health service delivery strategy. It is the focus of future research to provide new ideas for health services policy formulation by combining regional, economic, health resources, privacy, psychological problems and other factors. We hope that our study can encourage discussions of HIV health services, and set the stage for sharing and creating for service innovation.

Declarations

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Authors' contributions

Xiaoni Zhong was responsible of the conception and design of the study. Bing Lin, Jiaxiu Liu, Hong Pan and Yingjie Ma were in charge of the analysis and interpretation and the data collection process. All authors were involved in the drafting of the manuscript and critically reviewed it for important intellectual content. All authors gave their approval on the final version to be published and agreed to be accountable for all aspects of the work.

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Competing interests

The authors declare no competing interests.

Availability of data and material All data in this study were obtained from the HIV Health Services Survey of MSM in Western China. Because the data contain personal and private information, the data are not readily available to the public.

Consent for publication All study subjects in this study signed an informed consent form.

Ethics approval and consent to participate

All procedures of this study were in accordance with the ethical approval granted by the Ethics Committee of Chongqing Medical University. Informed consent was obtained in writing from all individual participants included in the study, and all methods were carried out in accordance with relevant guidelines and regulations. The Ethics Committee of Chongqing Medical University has reviewed the proposed use of human subjects in the above-mentioned projects. It is recognized that the rights and the welfare of the subjects are adequately protected; the potential risks are outweighed by potential benefits. We approve the project implementation according to plan.

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Figures

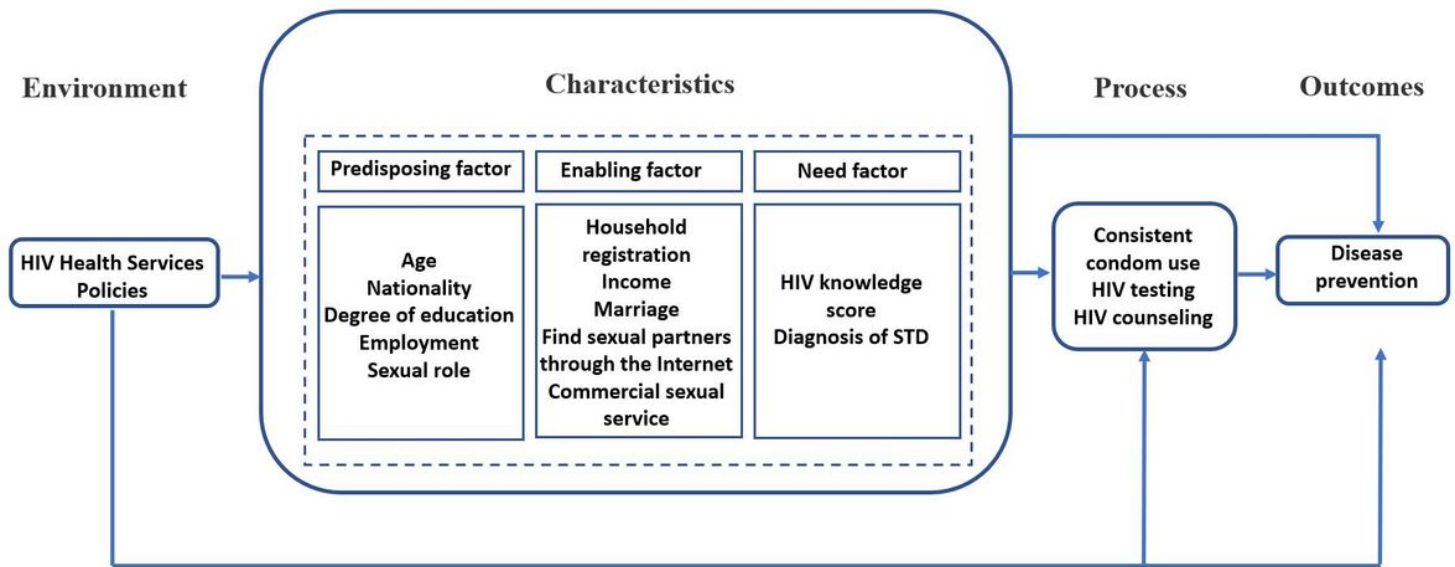


Figure 1

A diagram of the theoretical framework of Anderson Behavioral Model