

# The Feasibility and Acceptability of an HIV Web-Based Screening Program in Iran

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## Abstract

**Background:** Poor diagnosis remains a significant barrier to effective HIV control in Iran. A web-based screening program could provide a novel approach to address this challenge. This study aimed to evaluate the feasibility and acceptability of a web-based HIV screening program for identifying individuals with high-risk HIV behaviors in Iran.

**Methods:** A cross-sectional study was conducted using an educational website where individuals could anonymously complete a risk assessment questionnaire. Those with a history of high-risk behaviors were invited to attend voluntary counseling and testing (VCT) centers for HIV testing. Various strategies, including text messages, Instagram posts, and advertisements on local health center websites, were employed to promote website visitation.

**Results:** The website received 11,581 visits from 4,303 unique Internet Protocol (IP) addresses. Of these, 3,079 visitors (71.0%) accessed the questionnaire section, and 456 (14.8%) completed the questionnaire. Nine respondents (1.97%) were under 16 years old and were excluded. Among the remaining 447 participants, 254 (56.8%) were from Tabriz City. Of these, 180 (70.9%) reported engaging in high-risk sexual behaviors, drug use, or occupational exposure. Notably, this group's five individuals (2.8%) reported visiting VCT centers after completing the questionnaire.

**Conclusion:** Developing an educational website combined with targeted promotion appears to be a feasible and potentially effective strategy for increasing awareness of HIV and motivating individuals to seek testing. Incorporating online counseling and interactive educational materials managed by trained professionals may enhance the program's impact. Further studies are recommended to comprehensively evaluate this approach's feasibility and acceptability.

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## Introduction

The global community has committed to ending the AIDS epidemic by 2030. To achieve this ambitious goal, the Joint United Nations Programme on HIV/AIDS (UNAIDS) established the 95–95–95 targets for 2025. These targets aim for (1) 95% of all people living with HIV (PLHIV) to know their status, (2) 95% of all diagnosed individuals to receive sustained antiretroviral therapy (ART), and (3) 95% of those receiving ART to achieve viral suppression. Meeting these milestones is projected to reduce new adult HIV infections to 200,000 annually, marking a significant step toward ending the epidemic by 2030.<sup>1,2</sup> However, substantial gaps remain. In 2021, an estimated 1.5 million new HIV infections occurred—one million more than the global target for 2020. Furthermore, approximately 650,000 AIDS-related deaths were reported in 2021 despite the availability of effective HIV prevention and treatment measures. Only 75% of PLHIV worldwide had access to ART in 2021.<sup>3</sup>

In Iran, an estimated 53,000 people were living with HIV in 2021, with a range of 38,000 to 140,000 individuals. Of these, only 23,000 (43%) were aware of their status, and 16,000 (69.5%) had access to antiretroviral treatment (ART).<sup>4,5</sup> Despite various efforts by the Ministry of Health and other organizations, poor diagnosis rates remain the main obstacle to achieving the 2030 HIV objectives in the country.

National strategic programs for HIV in Iran have included raising community awareness, implementing harm reduction strategies for key populations such as people who inject drugs (PWID), female sex workers (FSW), men who have sex with men (MSM), and prisoners, preventing mother-to-child transmission (PMTCT), providing specific training programs for youth, expanding care services nationwide, and enhancing HIV testing services.<sup>6</sup> However, these interventions have not fully bridged the diagnostic gap.

To address this, a web-based HIV screening program was designed to evaluate its feasibility and acceptability among the general population, aiming to recruit individuals with high-risk HIV behaviors. With increasing global internet access, web-based education and screening hold significant potential for addressing diagnostic gaps. Studies in other countries, particularly among key populations such as MSM, have shown promising results for web-based HIV education and screening.<sup>7,8</sup>

However, more research is needed on the acceptability and effectiveness of such programs in Iran, particularly among the general population. This study seeks to address this gap by exploring the potential of web-based HIV screening to improve HIV diagnosis rates in Tabriz, the largest city in northwest Iran, with a population of approximately 1,762,000.<sup>9</sup> As of the end of 2022, 495 HIV cases

had been diagnosed in Tabriz, with 255 (45%) alive and 180 (80%) receiving ART.<sup>10</sup> The findings of this study could provide valuable insights for public health interventions aimed at achieving the 2030 objectives in Iran, mainly through innovative approaches like web-based HIV screening.

## Methods

### *Development of an Educational Website*

An educational website was created to provide comprehensive information on HIV transmission patterns, prevention strategies, and treatment approaches. The website included a variety of content formats, such as educational texts, videos, and animations, to engage users effectively. Additionally, the site featured a risk score questionnaire that individuals could complete anonymously. Those identified as engaging in high-risk behaviors were encouraged to visit Voluntary Counseling and Testing (VCT) centers for HIV counseling and testing.

### *Website Advertisement*

The website was promoted through multiple channels. It was advertised on the local health center's website, and an Instagram page was created to promote the platform. The Instagram page served as an interactive medium where users could privately ask questions about HIV through the "direct" section, and responses were provided. Furthermore, 4,202 text messages were sent via telecommunications services to individuals aged 16 to 54 years, proportionate to the age ratio of the population in Tabriz. These messages included a link to the website and information about the VCT centers. The educational website remained active for nine months, from June 1, 2021, to March 6, 2022, to ensure sufficient time for outreach and engagement with the target audience.

### *Questionnaire*

To create a culturally and situationally appropriate questionnaire for assessing HIV risk, existing literature and tools were reviewed, including the HIV/AIDS-Medindia Risk Calculator and guidelines suggested by the US Centers for Disease Control and Prevention (CDC) (cdc-hiv-mmp-questionnaire-2015-2017, Version 11.5.0).<sup>11, 12</sup> Based on these references, a 17-question instrument was developed to align with the local context.

Five experts, including epidemiologists, psychiatrists, and physicians experienced in HIV, evaluated and approved the questionnaire's qualitative content validity. To further validate the tool, a pilot study was conducted with 10 participants to identify comprehension issues and ensure the questionnaire effectively assessed the intended concepts, confirming its face validity. A re-test was performed with the same

group to evaluate reliability, achieving a reliability score above 89%.

The questionnaire included 17 questions.

• *The questionnaire comprised the following sections:*

• **Sociodemographic Data:** Questions covered age, sex, marital status, employment, city of residence, and sex of the sexual partner.

• **Lifetime Risk Assessment Data:** Questions included the history of job exposure (e.g., exposure to sharp objects), injection drug use, history of sexually transmitted infections, engagement in sexual activity with individuals other than the spouse, and Self-assessment of being at risk of HIV infection.

Participants who responded positively to the risk score tool were automatically shown the message: “You should take an HIV test.” For participants residing in Tabriz, the website displayed the addresses of nearby VCT centers. Participants outside Tabriz were advised to contact their local health centers to find VCT facilities. At VCT centers in Tabriz, visitors were asked how they learned about the center. Monthly records were maintained to track the number of visitors who accessed the VCT through the website and their HIV test results.

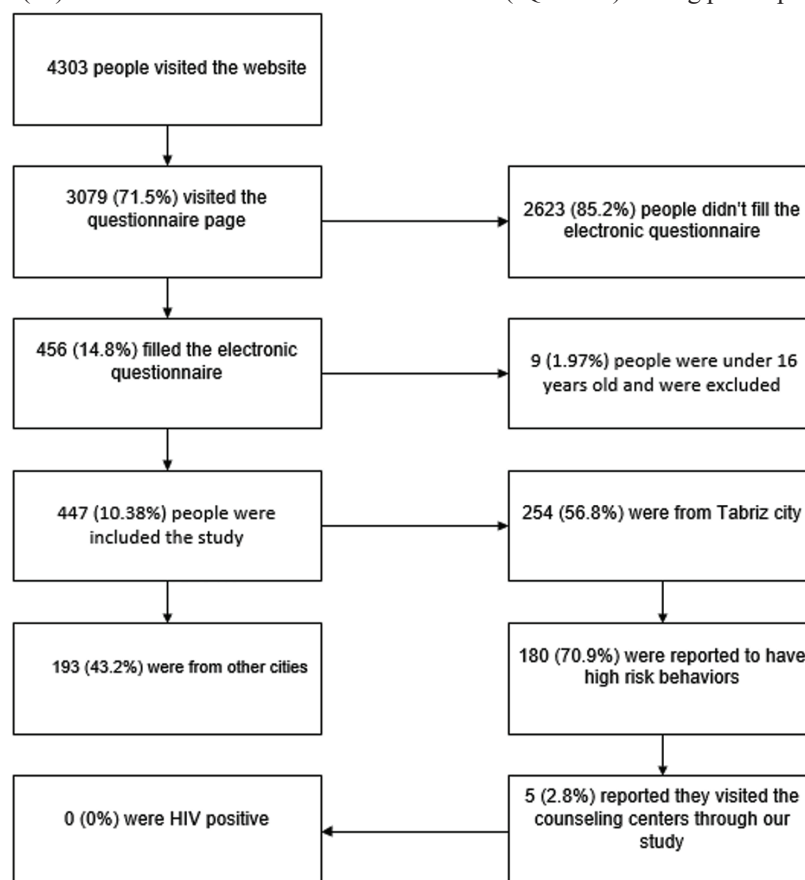
At the end of the study, website data—including questionnaire responses, the completion date, and Internet Protocol (IP) addresses—were extracted

for analysis. Quantitative variables were reported as frequency (percent), mean, standard deviation (SD), 95% confidence intervals (CI), and median with interquartile range (IQR). All statistical analyses were performed using SPSS-22 Software.

## Results

The website received 11,581 visits from 4,303 unique IP addresses, of which 456 individuals (14.8%) completed the electronic questionnaire. However, nine participants (1.97%) were excluded because they were under 16 and lacked parental consent to participate. As a result, the final sample consisted of 447 participants (10.38%), with 254 individuals (56.8%) residing in Tabriz. Among those who filled out the questionnaire, 312 participants (69.8%) were male (Figure 1). The mean age of participants from Tabriz was  $32 \pm 9.0$  years, ranging from 16 to 58, while the mean age of participants from other cities was  $25 \pm 6.0$  years, ranging from 16 to 48.

The history of drug injection was reported by five participants (2.0%) in Tabriz and by two participants (1.0%) in cities other than Tabriz. Overall, 260 participants (58.2%) reported a history of extramarital sex. The median number of sexual encounters with someone other than a spouse was three (IQR: 1–6) among participants in Tabriz and two (IQR: 1–4) among participants from other cities.



**Figure 1:** Participant flow chart illustrating the web-based feasibility and acceptability of the HIV screening study conducted in Tabriz, Iran, from June 2021 to March 2022.

Additionally, 8.3% of participants in Tabriz and 17.0% of male participants in cities other than Tabriz reported having experienced same-sex encounters. Furthermore, condomless sex with someone other than a spouse was reported by 66.1% of participants in Tabriz and by 69.7% of participants from other cities.

The mean and median scores for self-assessing the risk of HIV were 2.41 (95% CI: 2.14–2.68) and 1

(IQR: 1–3) out of 10, respectively, among participants from Tabriz. Participants from other cities had a higher mean and median risk perception, scoring 3.77 (95% CI: 3.36–4.17) and 3 (IQR: 1–5), respectively. A higher risk score indicates a more excellent perception of being at risk. A history of HIV testing was reported by 52 participants (21.2%) from Tabriz and by 44 participants (22.8%) from other cities (Table 1).

**Table 1:** Demographic characteristics and HIV-related high-risk behaviors of participants in Tabriz and other cities of Iran.

Variable	Tabriz; n (%)	Other cities; n (%)
Sex		
Male	186 (73.2)	126 (65.3)
Female	67 (26.4)	65 (33.7)
Other	1 (0.4)	2 (1.0)
Education		
High school or less	18 (7.0)	25 (13.0)
Diploma	46 (18.2)	52 (26.9)
Academic	190 (74.8)	116 (60.1)
Marital Status		
Single	118 (46.4)	150 (77.7)
Married	135 (53.2)	41 (21.3)
Widow	1 (0.4)	2 (1.0)
Job		
Student	41 (16.1)	64 (33.1)
Housewife	15 (5.9)	13 (6.8)
Having a job	186(73.3)	100(51.8)
Without a job	12 (4.7)	16 (8.3)
Having high-risk job*		
Yes	59 (23.2)	31 (16.0)
No	195 (76.8)	162 (84.0)
Job exposure among those with a high-risk job		
Yes	32 (54.3)	21 (67.8)
No	27 (45.7)	10 (32.2)
Lifetime experience of drug use		
Yes	8 (3.1)	15 (7.8)
No	246 (96.9)	178 (92.2)
Injection drug use		
Yes	5 (2.0)	2 (1.0)
No	249 (98.0)	191 (99.0)
History of sexually transmitted infections		
Yes	25 (9.8)	26 (13.5)
No	229 (90.2)	167 (86.5)
Having sex out of marriage		
Yes	118 (46.5)	142 (73.6)
No	136 (53.5)	51(26.4)
Condomless sex with someone other than the spouse		
Yes	78 (66.1)	99 (69.7)
No	40(33.9)	43(30.3)
Sex partners for male participants		
Male	8 (8.3)	17 (17.0)
Female	72 (74.2)	73 (73.0)
Both	17 (17.5)	10 (10.0)
Sex partners for female partners		
Male	19 (95)	37 (92.5)
Female	1 (5)	3 (7.5)
Both	0 (0)	0( 0)
Lifetime experience of HIV testing		
Yes	52 (20.4)	44 (22.8)
No	202 (79.6)	149 (77.2)

\*People who work with sharp tools such as suture needles, cupping tools, etc., in their jobs or who deal with blood and secretions of patients.

Out of the 254 participants from Tabriz City, 180 individuals (70.9%) were reported to have engaged in HIV-related high-risk behaviors. Among these 180 individuals, five (2.8%) were identified at the VCT centers in Tabriz City and reported being referred through the screening questionnaire. However, none of these individuals tested positive for HIV (Figure 1).

## Discussion

This is the first study to explore the feasibility and acceptability of HIV web-based screening in Iran. The results indicated that, despite high website visits and engagement with the questionnaire section, only about one in six to seven visitors completed the screening questionnaire. Additionally, the repeated visits to the website's educational content suggest users sought updated information on HIV and related topics. During the study, we were able to identify five participants (around 3% of eligible participants) who visited the VCT centers for HIV testing; however, none of them tested positive. Moreover, approximately one in five respondents reported having previously undergone HIV testing. Regarding sexual behaviors, about half of the participants from Tabriz and nearly two-thirds of participants from other cities reported having engaged in sex outside of marriage.

This study found that over 4,300 individuals visited the educational website over nine months. Previous research suggests that web-based interventions can effectively educate people about high-risk behaviors, particularly in countries where such behaviors are often stigmatized.<sup>13, 14</sup> Some individuals prefer to receive information about high-risk behaviors, such as drug use or sexual activities, from trusted, approved electronic sources.<sup>15-18</sup> A review of existing studies highlighted that social media platforms, including websites and applications, can be crucial in disseminating HIV prevention information and supporting intervention treatments.<sup>15</sup> For instance, a web-based study focused on HIV/STI prevention among African American women found that 63.4% of participants demonstrated increased knowledge of HIV/STI risks and risk reduction behaviors, such as using condoms more consistently.<sup>16</sup> In a similar study in Chile, which targeted women aged 18 to 24 at high risk of contracting STIs and HIV, 67.5% of participants completed the intervention.<sup>17</sup> Additionally, a cluster randomized controlled trial among Peruvian MSM using peer-led HIV education programs on Facebook found that 17% of the intervention group got tested for HIV, compared to just 7% in the control group.<sup>18</sup>

Approximately one in every six to seven people who visited the website completed the screening questionnaire. Additionally, we were able to trace five individuals who underwent HIV testing at the VCT centers. The feasibility and acceptability of

web-based HIV screening have been studied in key populations globally.<sup>7</sup> However, in Iran, where key populations are often hidden,<sup>6</sup> conducting web-based screenings for these groups becomes challenging. For instance, a study in Estonia involving 430 MSM found that around 70% of participants completed the questionnaire, and 26% agreed to undergo testing.<sup>7</sup> One of the key obstacles to web-based screening in Iran could be the fear of being monitored. While all HIV-related diagnostic and treatment services in Iran are confidential and free, the fear of punishment for engaging in extramarital sex may deter individuals from participating in web-based screening, as they are concerned that their IP address could be traced, compromising their privacy and safety.

The results showed that a significant proportion of those who completed the screening questionnaire had engaged in sex outside of marriage, with about half of the participants in Tabriz city and two-thirds in cities other than Tabriz reporting such behavior. Additionally, one out of every 12 male participants in Tabriz and one out of every six male participants in different cities had experienced sex with another male. Furthermore, approximately one-third of participants who reported having sex outside of marriage also engaged in sex without using condoms. We did not find studies that specifically examine the behaviors of the general population through web-based screening. One possible explanation for the high-risk behaviors observed among participants could be that those who visited the website and completed the screening questionnaire were more likely to have a history of high-risk behaviors, which may have skewed the results.

A web-based screening program for high-risk sexual and drug use behaviors, which are highly stigmatized in a conservative country like Iran, offers several benefits and challenges. One of the main advantages is high acceptability, as it ensures privacy and is cost-effective. Web-based programs are easily accessible to a larger population, making screening more widespread and convenient. Since people have 24/7 access to the internet, this eliminates the long wait times typically associated with clinic visits.<sup>14-19</sup> Additionally, the number of VCT centers is limited, usually located in provincial capitals and major cities, meaning individuals in smaller cities or rural areas may need to travel to neighboring locations for these services. Moreover, many people may feel embarrassed discussing sexual health concerns or visiting a VCT center due to stigma or fear of judgment.<sup>14</sup> As a result, people may prefer seeking information and consultations online rather than facing the perceived judgment from friends, acquaintances, neighbors, or clinicians. Web-based screening programs can be more cost-effective than establishing more VCT centers, particularly for preventive HIV initiatives. However, some challenges

need to be addressed. For instance, individuals with low literacy levels may struggle to engage with online screening programs, and participants must have basic computer and internet skills.

This is the first study to assess the feasibility and acceptability of a web-based screening program for HIV in Iran, and it has several strengths. First, we recruited a large and diverse sample of participants, which enhanced the generalizability of the study. We successfully engaged users from outside Tabriz city and included people with various demographic characteristics, such as differences in education, occupation, and HIV risk behaviors. This diversity helps broaden the applicability of the findings.

However, there were three limitations to this study. First, the evaluation was conducted over a relatively short period of nine months. We believe that extending the duration of the study could yield different results, as people might gain more trust in the website and its objectives over time, which could influence the participation rate. Second, the study was conducted during the COVID-19 pandemic, which may have impacted individuals' willingness to visit VCT centers due to fears of being exposed to the virus. If the study had been conducted at another time, the number of people visiting the VCT centers would have been higher. During the pandemic, there was a noticeable decrease in the number of newly diagnosed HIV cases in Iran, which could further suggest the influence of COVID-19 on HIV-related healthcare behaviors. Third, it is possible that some individuals who visited VCT centers did not report being referred through the web-based screening program due to the stigma associated with high-risk behaviors. This could have led to underreporting the program's impact on VCT attendance.

## Conclusion

Innovative approaches are essential to meeting the 2030 goals of controlling the HIV epidemic and increasing the number of diagnosed cases. In this study, we developed an educational website and encouraged visitors to visit VCT centers. We found that many individuals with high-risk behaviors visited the website. The website provided educational materials and allowed users to ask questions, which experienced professionals answered.

We believe that this approach when combined with traditional face-to-face programs at VCT clinics, could enhance the general population's understanding of HIV. Additionally, it could motivate individuals engaging in high-risk behaviors to get tested, thus improving case detection in the country. However, despite the high number of website visits, only a small number of people visited VCT centers for HIV testing. Therefore, further studies are needed to assess the

feasibility and acceptability of this approach.

To optimize the effectiveness of web-based screening, future research should focus on barriers such as participants' access to computers, digital literacy, and their awareness of HIV. We also recommend additional research to evaluate the impact of web-based screening on HIV prevention, treatment, and online counseling in conjunction with face-to-face services at VCT centers. This could enhance our understanding of the potential of web-based programs in reducing HIV transmission and developing effective prevention strategies in Iran.

## Ethics Approval and Consent to Participate

We obtained verbal informed consent from the participants. The Research Review Board of the Ethics Committee of Tabriz University of Medical Sciences approved the verbal informed consent. All methods followed the relevant guidelines and regulations outlined in the Declaration of Helsinki. At the beginning of the online questionnaire, participants were provided with an introduction explaining the research project, including the ethics code. Individuals were asked to complete the survey only if they agreed, with participation being entirely voluntary. Participation in this study was anonymous, and there was no face-to-face interaction with participants. The study protocol was reviewed and approved by the Research Review Board of the Ethics Committee of Tabriz University of Medical Sciences (Code: IR.TBZMED.REC.1399.876).

## Availability of Data and Materials

Due to data protection policies, the data supporting the present study's results are unavailable to the public. However, the corresponding author can make the data available upon reasonable request.

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Tabriz Health Services Management Research Center, Tabriz University of Medical Sciences, financially supported the study.

## Authors' Contribution

R.S. developed the study design, prepared and cleaned the data, performed the statistical analysis, and wrote the first draft. H.D. developed and maintained the website and Instagram page. A.M., R.Y.F., S.K.S., and L.J. contributed to the study design. L.S. assisted in interpreting the results and contributed to writing the first draft of the study. N.S. provided online advice via Instagram and the website, and H.SH. interpreted the results and wrote the final manuscript. All authors read and approved the final manuscript.

**Conflict of Interest:** None declared.

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