



Cost and cost-effectiveness of online recruitment to increase HIV self-testing among Black and Hispanic/Latino men who have sex with men in the United States, 2020–2021

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Abstract

Background: Black or African American and Hispanic/Latino gay, bisexual, and other men who have sex with men (BMSM and HLMSM) in the United States (US) are disproportionately affected by HIV. We analyze the cost and cost-effectiveness of HIV self-testing through online recruitment of BMSM and HLMSM into an HIV self-testing study.

Setting: 11 US states, February 2020–February 2021

Methods: BMSM and HLMSM aged ≥ 18 years without previous HIV diagnosis or current pre-exposure prophylaxis use were recruited through dating and general interest websites/apps (sites). Using the healthcare provider perspective and a 16-month timeframe, we assessed economic costs (2022 US Dollars) of online recruitment, HIV self-test (HIVST) distribution, and participant support. A time-motion study tracked staff time spent on study implementation activities. We reported incremental program cost, cost per HIVST used, and cost per new HIV diagnosis comparing recruitment via dating versus general interest sites.

Results: The total cost was \$275,776 to enroll 1,306 participants through dating sites, and support 1,005 MSM who used an HIVST (11.74% positivity). The total cost was \$168,099 to enroll 600 participants through general interest sites, and support 511 MSM who used an HIVST (5.48% positivity). Recruitment via dating versus general interest sites was more costly and more

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Conflicts of Interest

The authors have no conflicts of interest.

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effective, with incremental cost-effectiveness ratios (ICERs) of \$218/HIVST used and \$1,196/new diagnosis, relatively low cost per new HIV diagnosis compared with those estimated in other HIV testing interventions. ICERs were higher for HLMSM versus BMSM.

Conclusions: HIV self-testing through dating and general interest site recruitment may be an effective and cost-effective approach to increase new HIV diagnoses.

Keywords

HIV self-testing; micro-costing; cost-effectiveness; time-motion; United States; men who have sex with men

INTRODUCTION

Black or African American (hereafter referred to as Black) and Hispanic/Latino gay, bisexual, and other men who have sex with men (BMSM and HLMSM) in the United States (US) are disproportionately affected by HIV and jointly account for over two-thirds of new HIV diagnoses¹. Unfortunately, annual HIV testing rates are suboptimal, with screening rates lower than desired, particularly for older patients and patients in primary care settings², limiting linkage to care. Given barriers to accessing health facilities, including stigma and medical mistrust due to historic mistreatment faced by many US MSM^{3–5}, especially MSM of color^{6–10}, HIV self-testing may be uniquely well-suited to reach this high-need population.

HIV self-testing is a feasible and acceptable strategy to increase HIV testing and serostatus awareness among US MSM^{11–14} without risk compensation¹². *TakeMeHome*, a public-private partnership to distribute HIV self-tests (HIVSTs) to US MSM, successfully engaged MSM, many of whom had not previously tested (36%) or had not tested in the past year (56%)¹⁵. This suggests that HIV self-testing may be a good mechanism to reach people who do not regularly engage with facility-based healthcare. More recently, the US Centers for Disease Control and Prevention (CDC) launched *Together TakeMeHome*, a program that aims to distribute up to 1 million free HIVSTs between 2022–2027 to US populations nationwide¹⁶. During the first twelve months of distributing HIVSTs, nearly half of HIVST orders were placed by persons who had never tested for HIV (24%) or who had not tested in the last year (25%)¹⁷.

Online recruitment using culturally tailored marketing has been proposed to increase the distribution of HIVSTs to MSM^{18,19}. We previously reported that an intervention (*Evaluation of HIV Self-Testing Among MSM Project* [eSTAMP]) providing HIVSTs to online-recruited MSM increased both HIV testing and diagnoses compared to MSM who did not receive HIVSTs, with no reported risk compensation in those who received HIVSTs¹². However, BMSM and HLMSM were under-enrolled relative to their population proportions in this study, limiting generalizability to these groups.

Subsequently, the *Implementation of Rapid HIV Self-Testing Among MSM Project* (iSTAMP) was developed to determine best practices, effectiveness, costs, and cost-effectiveness of online recruitment to distribute HIVSTs to BMSM and HLMSM in 11

US states²⁰. We previously reported that iSTAMP was feasible, acceptable, and safe²¹. Here, we describe the cost and cost-effectiveness of iSTAMP in HIV self-testing among BMSM and HLMSM recruited through online dating and general interest sites.

METHODS

Study design.

The iSTAMP study protocol has been published²⁰. We analyzed observational cohort data where MSM were recruited via online websites/apps (herein, sites), and eligible men who provided informed consent were enrolled, provided with HIVSTs, and followed as described below.

Study population.

Participants were eligible for enrollment if they were assigned male sex at birth, identified as male, identified as Black or Hispanic, were ≥ 18 years of age, engaged in anal sex (insertive or receptive) with ≥ 1 man in the past 12 months, were not currently taking PrEP, had no prior HIV diagnosis, and were willing to download the study app on an Android or iOS device. Participants also had to reside in one of the following states, which were selected based on the race-specific population estimates for MSM²²: Alabama, California, Florida, Georgia, Louisiana, Mississippi, Nevada, New York, North Carolina, South Carolina, Texas. We previously reported that over 50% of participants were aged 18–29 years, and over three-fourths had post-high school education. Importantly, almost half reported not receiving an HIV test in the last year and almost a quarter had never tested²¹.

Online recruitment and enrollment.

We recruited BMSM and HLMSM online from February 2020–February 2021 via advertisements placed on two types of sites: dating sites (Jack'd, Grindr, Adam4Adam) and general interest sites (Facebook, Snapchat, Reddit, Pandora, Spotify). Following consultation with health departments, community-based organizations, and BMSM and HLMSM who had experience working with or researching BMSM and HLMSM populations, advertisement images and messaging were tailored to the target audience (Appendix 1). Advertisements were toggled on and off periodically over one year (e.g., one week on, one week off), and images and ad copy were routinely changed to encourage advertisement performance.

Clicking an advertisement led to a website with a brief overview of the study, an electronic consent form for eligibility screening, and the eligibility survey. Potentially eligible respondents were required to provide contact information (phone, email, name, and address) and were emailed a link to the electronic study consent and baseline survey which collected data on demographics, clinical, and sexual history. Project staff validated contact information and Internet Protocol addresses to prevent duplicate enrollments and fraudulent activity. Participants received e-gift cards valuing \$20 for completing the baseline survey. Persons who completed the baseline survey and passed the validation process were enrolled.

HIV self-testing.

Enrolled participants were mailed two HIVSTs (OraQuick® In-Home HIV test; OraSure Technologies Inc., Bethlehem, Pennsylvania) for personal use or to give to a social network associate (SNA) (e.g., partner, friend, family member). The OraQuick In-Home HIV Test has an expected sensitivity of 92% and specificity of 99.98%²³. Enrolled participants were provided with information for follow-up HIV testing and care for those with a preliminary new diagnosis. Video counseling sessions were available to participants upon request before, during, or after HIVST use.

HIV self-testing outcomes.

Participants were asked to complete a short online survey after using the HIVST and an online 4-month follow-up survey, which assessed HIVST use and results. To report HIVST results, participants selected one image and corresponding text descriptions of possible results: (1) “positive/HIV reactive”; (2) “negative/HIV non-reactive”; and (3) “test is not working (results do not look like example or there are no lines on the device)” (i.e., invalid). Participants were also instructed to upload a photograph of the HIVST result window. Study staff attempted to contact participants who reported results 1 or 3 to review the interpretation and discuss linkage to care.

Given the high sensitivity and specificity of HIVST are very high, we considered a positive HIVST result as equivalent to an HIV diagnosis, as has been done previously in other analyses with CDC collaborators^{24,25}. Thus, we define the outcome of new diagnoses as new diagnosis based on the OraQuick In-Home HIV test (OraQuick; OraSure Technologies, Inc).

Participants were also asked about SNA HIVST distribution, whether the SNA used the HIVST, and SNA HIVST results if known. Participants received e-gift cards valuing \$10 for reporting their HIVST result and \$30 for completing the 4-month follow-up survey.

Micro-costing.

Using the healthcare provider’s perspective (viewpoint of the healthcare provider incurring the costs, excluding patients’ time, costs, and productivity losses), we assessed the economic costs of implementing online recruitment and providing HIV self-testing and participant support. A standard micro-costing approach was used²⁶. No research costs (e.g., costs associated with survey development or analysis to answer research questions) were included. All costs are presented in 2022 US Dollars (USD).

Online recruitment costs. Online recruitment costs included study staff time to manage recruitment and enrollment (including validating participant eligibility and monitoring enrollment data); online banner advertisement placement; recruitment images; and enrollment incentives (i.e., complete the baseline survey). Costs of online advertisements and recruitment images were abstracted from accounting records.

HIVST and participant support costs. HIV testing and participant support costs included staff/personnel time to order HIVSTs, monitor HIVST results, provide phone and video counseling to those with new diagnoses, provide general phone counseling as

requested, other administrative tasks, incentives for reporting HIVST results, HIVST kits, and shipping. Costs of HIVST were estimated using the market price for the OraSure technologies OraQuick® In-Home HIV Test (\$38.99/kit) with two kits mailed to each participant. Shipping and handling costs were abstracted from accounting records.

Measurement and valuation of staff time (time-motion study). We used Clockify (COING Inc, Palo Alto, CA), a free time tracker application (both web-based and mobile), to track study staff hours in real-time across work activities. After receiving a 1-hour training on the use of Clockify, all staff used the Clockify application over a 6-week period (Oct 2020-Nov 2020) to record hours dedicated to a list of pre-programmed activities. Tracked work activities were grouped into categories of: 1) recruitment and enrollment (e.g., recruitment, enrollment, validating eligibility, and monitoring enrollment data); 2) video counseling; 3) HIVST ordering (processing of HIVST orders for shipment); 4) phone counseling; and 5) other administrative tasks. The distribution of study staff for each activity during the 6-week period was extrapolated to the entire study period (16 months). Since iSTAMP study staff involved in implementation activities were at the same general professional level (entry-level with MPH degrees), we used the average full-time salary (\$26.88/hour) plus fringe (28%) of an employee in Georgia at this level to value their time.

Analysis of cost and cost-effectiveness.

We categorized costs into fixed and variable costs and reported the distribution of costs across activities. In cost-effectiveness analyses, we compared HIV self-testing of BMSM and HLMSM recruited through dating versus general interest sites for primary outcomes of HIVST use and new HIV diagnoses. HIVST use was defined as reported HIVST use on the initial HIVST reporting survey or the 4-month survey. New HIV diagnoses were defined as an HIV positive test result reported on the initial HIVST reporting survey or the 4-month survey. We excluded participants (8%) who were recruited under an unknown recruitment category, which occurred due to technology errors or sharing of the study URL.

We applied standard methods used in economic evaluation^{26,27} and those used for a variety of HIV prevention interventions^{27–29}. Cost and outcome data were entered into a standardized Microsoft Excel spreadsheet with embedded formulas. Given the short (16-month) timeframe of the study (12 months of recruitment and self-test distribution and 4 months for reporting HIVST use and testing outcomes), no discounting of costs or outcomes was applied. Average cost-effectiveness ratios (ACERs), and incremental cost-effectiveness ratios (ICERs) comparing two online recruitment strategies, dating versus general interest sites, were calculated. For example, the incremental cost per HIVST used was calculated as: $[(\text{Cost}_{\text{Dating}} - \text{Cost}_{\text{General}})] / [(\text{HIVST used}_{\text{Dating}} - \text{HIVST used}_{\text{General}})]$. Analyses were conducted overall and separately for BMSM and HLMSM.

Sensitivity analyses.

In sensitivity analysis, we considered the impact of missing HIVST use and resulting outcomes using simple imputation, replacing missing values with the mean of the observed values, under the assumption that the missing outcome data followed the same distribution as the observed data. We also considered the impact of reported SNA distribution outcomes

on cost per HIVST use and new HIV diagnoses. Finally, we conducted our analyses under the assumption that a lower cost per test kit (\$28/kit) could be obtained for public health programs.

RESULTS

Costs and enrollment.

The total program cost of HIV self-testing through dating and general interest sites was \$275,776 and \$168,099, respectively (Table 1). The costs were distributed similarly across program activities in dating versus general interest recruitment sites, with a majority of the costs allocated to online advertisement placement (33% and 38%), HIV self-test kits (34% and 32%), and participant incentives (10% and 7%).

Overall, 1,906 men were enrolled through dating (n=1306) and general interest (n=600) sites (Table 2). More BMSM participants were recruited from dating sites relative to HLMSM (75% vs 25%), whereas more HLMSM participants were recruited from general interest sites relative to BMSM (81% vs 19%). The average cost per participant enrolled was slightly lower for HLMSM vs BMSM recruited from dating sites (\$94 vs \$102) or general interest sites (\$132 vs \$170) (Appendix 2).

Costs of HIVST use and new diagnoses.

The cost of testing through dating sites reflected the cost to enroll participants through dating sites, provide HIVST, and support 1,005 MSM who used at least one HIVST, with 118 new diagnoses (11.74% positivity, Table 2). The average cost per HIVST used was \$274 and the average cost per new diagnosis was \$2,337. The average cost per HIVST used was similar for racial/ethnic groups (\$277 for BMSM vs \$268 for HLMSM), and the average cost per new diagnosis was lower for BMSM vs HLMSM (\$2,139 for BMSM vs \$3,250 for HLMSM). Most economic resources and outcomes for dating sites were driven by the site Jack'd (Appendix 2).

The cost of testing through general interest sites reflected the cost to enroll participants through general interest sites, provide HIVST, and support 511 MSM who used an HIVST, with 28 new diagnoses (5.48% positivity). The average cost per HIVST used was \$329 and average cost per new diagnosis was \$6,004 (Table 2). The average cost per HIVST used was similar for racial/ethnic groups (\$362 for BMSM vs \$321 for HLMSM), and the average cost per new diagnosis was higher for BMSM vs HLMSM (\$7,029 for BMSM vs \$5,781 for HLMSM). Most economic resources and outcomes for general interest sites were driven by the site Snapchat (Appendix 2).

Comparing dating versus general interest sites, the incremental cost per HIVST used under dating site was \$218, suggesting HIV self-testing through recruitment via dating sites was more effective and more costly (Table 2, Figure 1A). The corresponding incremental cost per HIVST used for BMSM similarly indicated that the testing strategy was more effective and more costly (ICER=\$264); meanwhile, the incremental cost per HIVST used for HLMSM indicated that the strategy was less effective and less costly (ICER=\$407).

Comparing recruitment via dating sites versus general interest sites, the incremental cost per new diagnosis was \$1,196 (Table 2, Figure 1B). The corresponding incremental cost per new diagnosis for BMSM similarly indicated that the study was more effective and more costly (ICER=\$1,874); the incremental cost per new diagnosis for HLMSM indicated that the study was less effective and less costly (ICER=\$32,350).

Sensitivity analyses.

Fourteen percent of those enrolled had missing data for HIVST use, and 2% of HIVST users had missing data for HIV test results, with no differences in missingness by racial/ethnic group. The impact of missing/unknown data on costs and cost-effectiveness of HIVST use and new diagnoses are shown in Table 3. Under the assumption that the distribution of the missing/unknown data followed the same distribution as the observed data, the ACERs and ICER for HIVST use decreased compared to base case (8–13% decrease in ACERs, 33% decrease in ICER); the corresponding values for new diagnoses remained unchanged compared to base case.

Additionally, participants self-reported distributing 410 HIVST to SNAs, of whom 235 reported that the HIVST was used by a SNA, and 10 of those tests were new diagnoses. Including the ancillary benefit of SNA distribution in our analyses, the ACERs and ICERs for HIVST use decreased (12–15% decrease in ACERs, 10% decrease in ICER) and for new diagnoses decreased (6–7% decrease in ACERs, 6% decrease in ICER) compared to base case.

Finally, assuming a reduced price for the HIVST kits, ACERs and ICERs for HIVST use decreased (9% decrease in ACERs, 11% decrease in ICER) and for new diagnoses decreased (9–10% decrease in ACERs, 10% decrease in ICER) compared to base case.

DISCUSSION

To our knowledge, iSTAMP is the first report on the costs and cost-effectiveness of HIV self-testing via online recruitment of US BMSM and HLMSM. Recruiting BMSM and HLMSM via online sites is an effective and cost-effective approach to identifying infections in undiagnosed persons.

iSTAMP identified new diagnoses at relatively low cost (\$2,337–\$6,004/new diagnosis). These findings suggest that HIV self-testing via online recruitment may be highly cost-effective. Prior cost-effectiveness studies have estimated that a cost per new diagnosis could be as high as \$35,732 (in 2022 US dollars) for a testing program to be cost-saving and \$98,490 to be cost-effective in the US³⁰. Additionally, the cost per new diagnosis in iSTAMP is generally favorable compared to other US testing programs. For example, the eSTAMP HIV self-testing program, which primarily recruited white MSM, found a cost per new HIVST diagnosis of \$17,455²⁵. The *TakeMeHome* HIV self-testing program reported a cost per confirmed new HIVST diagnosis of \$10,288³¹. The CDC reports a range of cost per confirmed HIV diagnosis in other non-clinical settings (e.g., jails, offices, shelters, bathhouses, mobile vans, and community-based organizations) from \$4,949–\$29,753^{32–35}. Meanwhile, in clinical settings, costs per new confirmed diagnosis, ranging from \$2,465–

\$12,975^{36–41}, are generally lower than for non-clinical settings. Of course, testing in non-clinical settings remains critical due to barriers to accessing clinical care, in particular those who may be at highest risk of HIV⁴².

The cost per HIVST used in iSTAMP (\$274–\$329/HIVST used) is higher compared with other HIV self-testing programs, but within the range of other US testing programs in non-clinical settings. For example, eSTAMP found a cost per person tested of \$172²⁵. *TakeMeHome* reported a cost per person tested of \$71³¹. In other non-clinical settings like mobile vans and community-based organizations, cost per person tested ranges from \$197–\$899^{34,35}. Differences may be driven by increasing costs of advertising over time as well as higher costs for the HIVST kits used in iSTAMP relative to other programs. Meanwhile, in clinical settings, where advertising and HIVST kits are not needed, costs per HIV test are generally lower, ranging from \$24–\$91^{41,43–45}. However, many patients with HIV risk factors face barriers to accessing services in clinical settings^{46–48}, as indicated by the fact that almost a quarter of our participants had never been HIV tested.

Online ad placement was one of the largest costs (33%–38%) and potentially the most uncertain cost of the study. The selected sites had differing ad display, targeting, and pricing options. Given that these options change often and the specific sites we employed may not be popular or even exist during future studies and programs, what follows are general implementation and cost considerations.

Different sites had different options to display ads and different cost structures. For example, some charged per screen takeover/pop-up (e.g., Jack'd, Grindr). Grindr also offered a more expensive inbox messaging option. Meanwhile, some sites had banner ad options and charged by cost per click or cost per impression (e.g., Snapchat, Grindr, Facebook, Reddit) or charged a fixed cost per posting (e.g., Adam4Adam). Some sites required a minimum spend (e.g., Adam4Adam). Facebook additionally had a bidding system to possibly have ads displayed at prime times. No site would cycle ads automatically, so each payment was for one ad copy.

Different sites also offered different options for ad targeting. Some allowed for no targeting at all, whereas others allowed targeting by gender (e.g., Facebook, Snapchat), location (e.g., Grindr), or proxy indicators of the target population (e.g., attendance at Historically Black Colleges and Universities; stated media, influencer, shopping interests) generally at no extra cost. Importantly, the landscape for ad targeting and pricing has and will likely continue to change. The European Union ruled in October 2023 that Meta must seek user consent before using their personal information to sell targeted ads on Facebook and Instagram⁴⁹, and in the US, Facebook no longer targets ads by sexual orientation.

Implementers of HIVST programs may benefit from lessons learned during our program. Given this evolving landscape, the implementers of online recruitment may need to be familiar with which sites are popular with their target population and what ad copy would work well for them. In our study, a community advisory board (CAB) was valuable to ensure ads were appropriate and appealing. To reach a diverse target population, implementers may need to diversify ads and platforms – for example, if we had only pursued recruitment via

Jack'd because it was performing well among BMSM, we could have missed recruitment of HLMSM from Snapchat. Thus, cost is not the only consideration if trying to engage individuals from multiple target populations. Programs may consider regularly monitor site and ad copy performance to identify when they are not performing well. For example, Lesbian, Gay, Bisexual and Transgender interest sites not geared toward dating (Pride Media, Pink News) were initially used for recruitment but were stopped due to low yield. Monitoring demand is also important as too many ads can lead to too much demand, which could overload staff and reduce quality.

Test kits were the other large driver of program costs (32%–34%). We apply the current market cost of HIVST kits, but this could change or potentially be negotiated with bulk purchases. Additionally, program costs may vary by prior resource availability (e.g., images) or across different states. For example, we applied the estimated hourly wage for staff with an MPH in Georgia; the current equivalent salary in California is roughly double. The hours per activity shown in Appendix 2 may help implementers project costs for their context. Importantly, we used a time-motion study to more accurately estimate these hours by activity using a real-time tracker (Clockify) relative to studies which often use surveys, self-report, or expenditure records³².

The proportion of positive HIVSTs in iSTAMP was higher (6% general interest sites and 12% dating sites) than what has been seen in the TakeMeHome HIVST program (1.4%⁵⁰). TakeMeHome and Together TakeMeHome are large programs accessible to the general population, and the percentage of reactive tests is likely an underestimate due to low reporting of results (the report of results was not incentivized). Additionally, iSTAMP was restricted to two US populations most likely to have undiagnosed HIV infection (BMSM and HLMSM¹), and studies have shown that MSM using dating sites have a greater frequency of condomless sex, more STIs, and more sex partners^{51–55}. Finally, participants eligible for iSTAMP had to have engaged in anal sex with a man in the past year and not be on PrEP, two criteria which place them at higher HIV risk than the general population.

Our findings should be interpreted considering limitations. Because HIVST use is self-reported, it undercounts people who used a test but did not complete the survey (meaning ACER and ICER estimates are likely conservative, as indicated by sensitivity analyses). Some data could be misreported, especially SNA HIVST use and results (most participants reported their own HIVST result correctly based on the images provided²¹). Again, we expect that any information bias related to reporting would underreport outcomes, leading to more conservative estimates. Costs and cost-effectiveness estimates are based on online recruitment of BMSM and HLMSM living 11 states, limiting generalizability of the findings. Additionally, our analysis of the costs or cost-effectiveness estimates do not consider longer-term effects (e.g., HIV infections averted due to linkage to ART or PrEP) and health consequences (e.g., quality-adjusted life-years) – incorporation of longer time horizons may make the strategies cost-saving. The time and motion study was conducted after iSTAMP was running efficiently, and the average number of participants enrolled during this time period was similar to that of the overall program, both of which lends support that the time and motion data are generally representative of the overall program. However, these data may not exactly quantify staff time for the entire program, which is not

expected to have a substantive impact on the results given that staff time was a relatively small cost of the program. We acknowledge that our findings are less directly comparable to studies that include costs of confirmatory testing, though we note that confirmatory testing costs only apply to those with a positive HIVST result and therefore have minimal influence on overall program costs. Some HIVST test results may be incorrect which could affect downstream costs related to linkage to care and confirmatory testing. Finally, our analyses were conducted from the healthcare provider's perspective, and therefore participant costs are not included. However, it is unlikely that participant time, primarily time spent taking and returning the HIVST, would differ across online recruitment venues, and thus we would not expect any impact on the ICER estimates. Participant costs and time spent on HIV self-testing is likely lower than participant time spent seeking HIV testing in a clinical setting.

CONCLUSIONS

HIV self-testing through dating and general interest site recruitment may be an effective and cost-effective approach to enhance HIV testing and increase new HIV diagnoses. Sites geared toward dating may reach people with HIV risk factors and could comprise a useful component of an online HIV self-testing recruitment strategy, though multiple platforms may be needed to reach all members of the target population. Our findings inform efficient implementation of online recruitment strategies to engage US BSM/HLMSM in HIV self-testing. Future studies of linkage to care after HIVST are needed.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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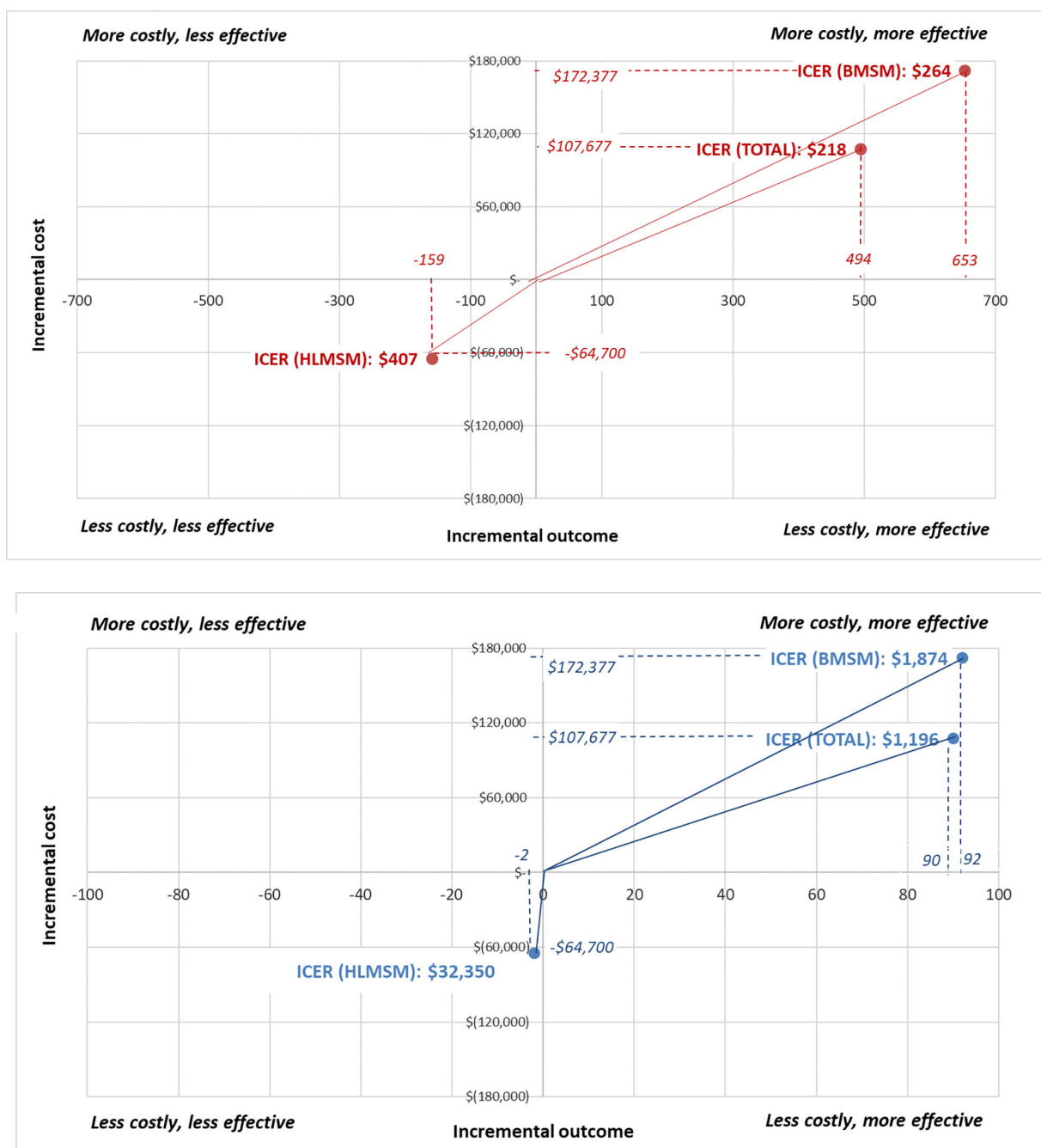


Figure 1.

Cost-effectiveness plane comparing recruitment of BMSM and HLMSM living in 11 US states via dating sites versus general interest sites, 2020–2021

A. Incremental cost per HIVST used for recruitment via dating sites vs general interest sites

B. Incremental cost per new diagnosis for recruitment via dating sites vs general interest site

ICER: incremental cost-effectiveness ratio

BMSM: Black men who have sex with men

HLMSM: Hispanic and Latino men who have sex with men

HIVST: HIV self-test

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Table 1.

Distribution of iSTAMP costs by online recruitment of BMSM and HLMSM living in 11 US states, 2020–2021

	Dating Sites		General Interest Sites	
	Cost (\$)	%	Cost (\$)	%
Fixed costs				
<i>Materials and Other Consumables</i>				
Online advertisement placement	89,659	32.5	63,209	37.6
Recruitment images	100	0.04	100	0.1
Variable costs				
<i>Materials and Other Consumables</i>				
HIVST kits ^a	94,200	34.2	54,430	32.4
HIVST kit shipping ^a	18,857	6.8	10,896	6.5
Incentives for completion of baseline survey ^b	26,120	9.5	12,000	7.1
Incentives for reporting HIVST results ^b	13,060	4.7	6,000	3.6
<i>Staff/Personnel^c</i>				
Recruitment and enrollment	14,545	5.3	8,404	5.0
Video counseling ^d	2,005	0.7	1,361	0.8
Ordering HIVST kits	659	0.2	448	0.3
Phone counseling	15,238	5.5	10,346	6.2
Other administrative tasks	1,333	0.5	905	0.5
Total costs	275,776		168,099	

^a 2,416 HIVST were distributed to participants recruited via dating sites, and 1,396 tests were distributed to participants recruited via general interest sites.

^b Incentives to enroll and complete the baseline survey were provided to 1,306 participants recruited via dating site and 600 participants recruited via general interest sites.

^c Over the course of the study, there were eight staff, of which three were full time and five were part time graduate students or employees at other universities

^d Study staff spent a total of 97.5 hours to provide video counselling support to N=72 study participants (50 from dating and 22 from general interest sites)

HIVST: HIV self-test; BMSM: Black men who have sex with men; HLMSM: Hispanic and Latino men who have sex with men.

Table 2.

iSTAMP costs, outcomes, and cost-effectiveness of online recruitment of BMSM and HLMSM living in 11 US states, 2020–2021

	Dating Sites	General Interest Sites	Dating vs General Interest
	Total	Total	Incremental
Testing Outcomes			
Participants enrolled	N	N	N
Total	1306	600	706
BMSM	974	113	861
HLMSM	332	487	(155)
Participants who used HIVST	N	N	N
Total	1005	511	494
BMSM	750	97	653
HLMSM	255	414	(159)
Participants with new HIV diagnoses	N	N	N
Total	118	28	90
BMSM	97	5	92
HLMSM	21	23	(2)
Program cost (\$)	USD (\$)	USD (\$)	USD (\$)
Total	275,776	168,099	107,677
BMSM ^{a,b}	207,524	35,147	172,377
HLMSM ^{a,b}	68,252	132,952	(64,700)
Cost per HIVST used (ACER, ICER)	ACER	ACER	ICER
Total	274	329	218
BMSM	277	362	264
HLMSM	268	321	407
Cost per new HIV diagnosis (ACER, ICER)	ACER	ACER	ICER
Total	2,337	6,004	1,196
BMSM	2,139	7,029	1,874
HLMSM	3,250	5,781	32,350

^aDating sites: costs allocated based on the proportion of participants screened (23% BMSM, 77% HLMSM) and enrolled (19% BMSM, 81% HLMSM)

^bGeneral Interest sites: costs allocated based on the proportion of participants screened (76% BMSM, 24% HLMSM) and enrolled (75% BMSM, 25% HLMSM)

Negative numbers shown in parentheses

ACER: average cost-effectiveness ratio; total cost divided by total outcome

ICER: incremental cost-effectiveness ratio; incremental cost divided by incremental outcome

BMSM: Black men who have sex with men

HLMSM: Hispanic and Latino men who have sex with men

HIVST: HIV self-test

Table 3.

Sensitivity analysis: Impact of missing/unknown outcome data, SNA distribution, and reduced HIVST kit costs on HIVST use and new diagnoses during online recruitment of BMSM and HLMsM living in 11 US states, 2020–2021

	HIVST use				New diagnoses			
	Base case	Imputing missing HIVST use data ^a	Including SNA HIVST use	Reducing HIVST kit costs ^c	Base case	Imputing missing HIVST result data ^b	Including SNA HIVST result	Reducing HIVST kit costs ^c
ACER: dating	\$274	\$239	\$240	\$248	\$2,337	\$2,337	\$2,189	\$2,112
ACER: general interest	\$329	\$297	\$280	\$299	\$6,004	\$6,004	\$5,603	\$5,456
ICER: dating versus general interest	\$218	\$183	\$196	\$195	\$1,196	\$1,196	\$1,121	\$1072

^aThe observed distribution of HIVST use among the enrolled: 77% dating; 85% general interest

^bThe observed distribution of HIVST new diagnoses among HIVST users: 11.74% dating; 5.48% general interest

^c Assumed negotiated price of \$28/HIVST kit

HIVST: HIV self-test

BMSM: Black men who have sex with men

SNA: social network associate

ICER: incremental cost-effectiveness ratio

ACER: average cost-effectiveness ratio

HLMsM: Hispanic and Latino men who have sex with men