

# HIV self-testing during COVID-19 in Santa Clara County, California, USA

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## Abstract

**Introduction:** During COVID-19, healthcare providers reported decreased testing volumes, which meant fewer people knew their HIV status. To improve testing volumes, The County of Santa Clara Public Health Department offered a pilot HIV self-testing (HIVST) program for eligible populations.

**Material and methods:** The purpose of this study was to understand overall reach of the intervention and effectiveness of strategies used to raise the program awareness from November 2021 to August 2022, using an observational study design. Participants were recruited through both in-person and digital outreach methods. Individuals completed an online survey in order to participate in the study. Research team collected and analyzed all responses using descriptive analysis.

**Results:** A total of 458 individuals participated in the program. Of participants 232 that responded to optional questions the majority (77%) were identifying as male and 7% identifying as transgender, gender non-binary, or genderqueer. Social media advertisements on gay dating apps and outreach at community events were identified as effective methods for increasing awareness. Of the total participants, 21% had never taken an HIV test before, 58% selected this program for convenience reasons, and 41% received pre-exposure prophylaxis (PrEP) services.

**Conclusions:** HIVST programs have the potential to address barriers in accessing testing services. Healthcare providers are encouraged to offer HIVSTs as options for patients.

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**Key words:** HIV self-testing, HIV education, health promotion, health education, COVID-19.

## Introduction

### HIV epidemiology and COVID-19

While rates of human immunodeficiency virus (HIV) are observed to be declining overall in most states, HIV continues to disproportionately impact the Hispanic/Latinx, African American, and LGBTQ+ communities. Currently, an estimated 1.2 million people are living with HIV in the US and about 13% are unaware of their HIV status [1]; many others are diagnosed late in infection [2].

In Santa Clara County, HIV diagnoses fell more than 30% from 162 in 2019 to 115 in 2020 [3, 4], as a decline that became more evident during the COVID-19 pandemic. At the Crane Center, the County of Santa Clara Public Health Department (SCCPHD) express testing clinic that offers free, anonymous, and confidential HIV testing, the number of HIV tests were consistent from 2017 to 2019 (1,329-1,360 HIV tests annually), but dropped in 2020 to less than half the tests administered during the previous year (544 HIV tests).

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## HIV testing as a strategy for prevention

Widespread HIV testing is a critical step in ending the HIV epidemic, as it would decrease the number of undiagnosed individuals, lead to earlier diagnosis, improve prognosis, and reduce transmissibility for those infected. Studies have shown that early diagnosis of HIV infection may decrease infected persons' risk behaviors, making them less likely to transmit HIV to others [5, 6]. An earlier diagnosis of HIV also enables timely linkage to care and treatment initiation that can lead to increased viral suppression rate, and overall decreases the infectivity and likelihood of further HIV transmission [7, 8]. Additionally, viral suppression prevents disease progression, reducing the risk of developing HIV-related complications [1, 9].

## Barriers to HIV testing

Despite the proven benefits of early and routine HIV testing, a majority of US adults remain untested due to significant barriers [10, 11]. Structural barriers and barriers specific to the COVID-19 pandemic are disproportionately distributed across groups. Men who have sex with men (MSM) are over 40 times more likely to be infected with HIV than the general population, and 93% of all diagnosed HIV infections came from male-to-male sexual contacts [12]. A study in New York among users of Grindr, a popular social and sexual networking application (app) commonly used by MSM, found that about one-third of users had not been tested for HIV within the past year [13]. Moreover, a study amongst Los Angeles Grindr users found 17% of them reporting that they had not been tested for HIV within the past year [14]. Barriers to HIV testing include ease of access to testing and results, stigma associated with testing, and psycho-social factors that inhibit getting tested [15-20]. In one study among gay and bisexual men, the most commonly reported barrier to testing was annoyance at having to return for test results [21]. A separate study that assessed barriers to HIV screening among adolescents reported that the most common barrier was concern of confidentiality [22]. In a systematic review of 42 studies from 12 countries (majority from South Africa), the most cited barrier was convenience including transportation costs and distance, followed by stigma and long wait time [23]. These barriers in combination with the COVID-19 pandemic further limited overall health systems' capacity in the US to adequately address HIV prevention and care.

## HIV self-testing

HIV self-testing (HIVST) is an emerging prevention strategy that has the potential to overcome the aforementioned barriers, increase testing rates, reduce late diagnoses, and thereby decrease HIV-related incidence and mortality. HIVST refers to the self-administered collection of an individual's sample, followed by a rapid test with accompanying results, which allows individuals to perform a test themselves

in a confidential private place, and bypass barriers that discourage people from getting tested. While this was an accepted testing option among participants in several studies, the access to and availability of this option were limited in many clinical settings. For example, MSM participants reported a strong preference in HIVST versus clinic-based testing, and some who had never been tested believed they would test more regularly through self-testing; other at-risk individuals preferred a private HIVST due to a decreased feeling of stigma [24-28]. Furthermore, HIVST can also provide an opportunity to identify individual interested in HIV pre-exposure prophylaxis (PrEP).

## Local health department programming

The SCCPHD piloted an HIVST program for eligible populations through the 'Getting to Zero' (GTZ) initiative that strives to achieve zero new HIV infections, zero HIV deaths, and zero HIV-related stigma. Participants were eligible if they: (1) were 17 years of age or older, (2) currently working or living in Santa Clara County, and (3) identified as member of a priority population. Priority populations included MSM, transgender, non-binary or genderqueer, LGBTQ+, Hispanic/Latinx, Black/African ancestry, and people who inject drugs. These eligibility criteria were determined both based on local epidemiologic risk factors and external sources [29].

To increase program awareness and uptake, GTZ conducted limited in-person outreach at community events, encouraged word-of-mouth information-sharing, hosted news media events, and shared social media posts on Facebook and Instagram. SCCPHD also contracted with a marketing vendor to launch a campaign using paid ads on social media platforms, mobile dating apps, and magazines. This social marketing advertising campaign was launched within the SF Bay Times and Instinct Gay Magazines, and the Grindr and Adam4Adam dating applications between April 1 and May 15, 2022 (Figure 1). Interested individuals were directed to complete an anonymous survey for eligibility determination through Qualtrics, an online survey assessment tool. The link to the survey was available on the SCCPHD website.

Eligible individuals were prompted to provide their physical address for the purposes of mailing them an HIVST, opt for a subscription to receive a free test kit every three months, or request information on HIV PrEP. Those who requested information on HIV PrEP were linked to a PrEP Navigator within 24-72 hours. When the test kit arrived in the mail, it contained instructions on how to complete the test as well as resource materials including guidance on next steps depending on the test result. These resource materials comprised contact information to the SCCPHD linkage to care and PrEP navigation services programs (Figure 2).

## Significance of research

There is limited current research that examines the uptake of self-testing programs in local communities during

the COVID-19 pandemic. Furthermore, there is limited research aiming at understanding which outreach methods are more successful than others to increase visibility and uptake of self-testing programs during COVID-19. As such, the purpose of this study was the following: (1) to understand the effectiveness of outreach strategies to increase awareness of the HIVST program, and (2) to understand the reach of the SCCPHD HIVST program during November 2021 and August 2022, including population demographics, current and past sexual and social behaviors, and linkage to PrEP services.

## Material and methods

### Study design

We employed an observational, descriptive study design to evaluate the HIVST program. This entailed retrospective review and analysis of Qualtrics survey data collected from program participants between November 2021 and August 2022. All participants consented to record their responses within Qualtrics. This study was exempt from an Institutional Review Board review.

### Data collection instrument

A Qualtrics survey was administered that assessed participants' eligibility, demographic variables, social and beha-

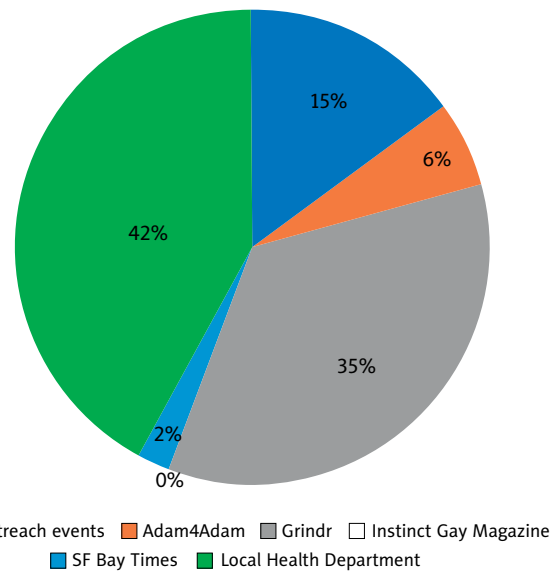


Figure 1. Survey completions by source

violar risk factors, and PrEP knowledge. The survey contained 40 items, some of which were marked as optional. Prior to launching the survey, we created unique survey codes to match the outreach strategy employed to engage program among participants. We also measured face and content validity by conducting a pilot test among seven ( $n = 7$ ) individuals.

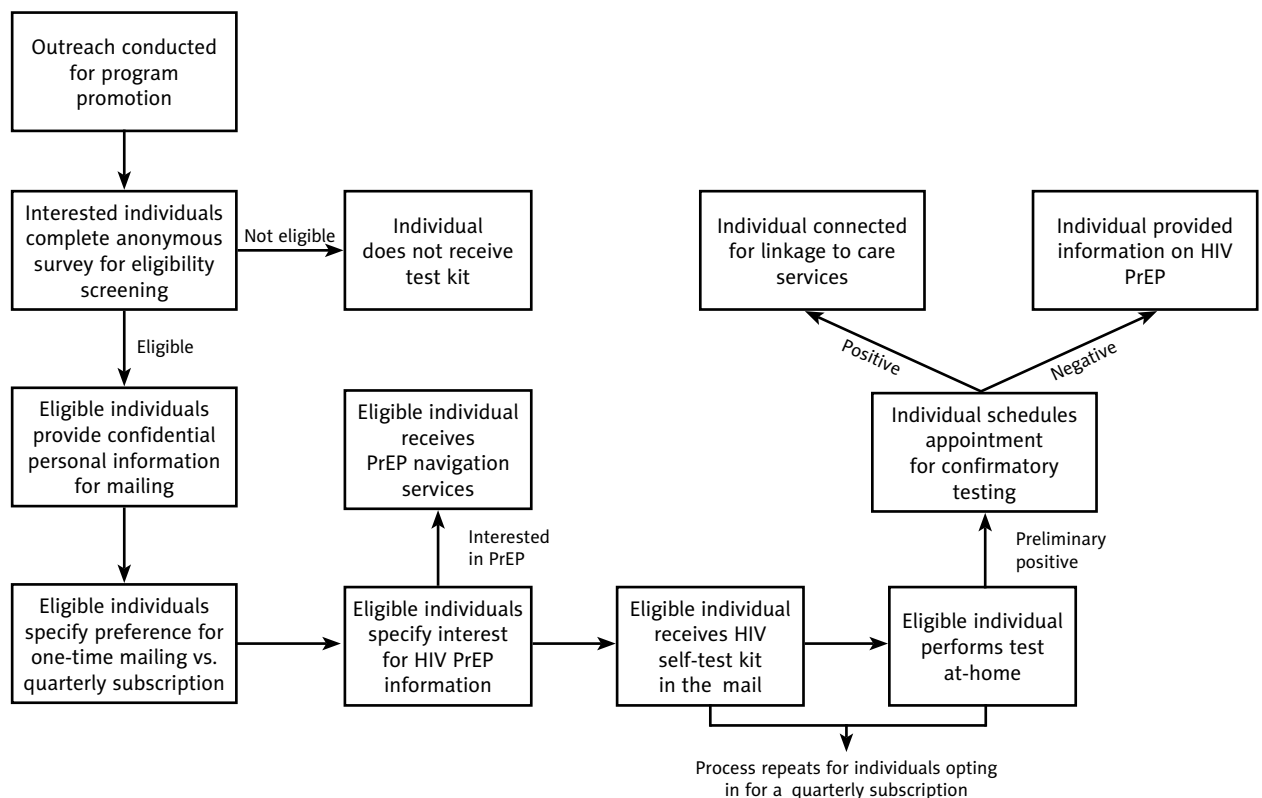
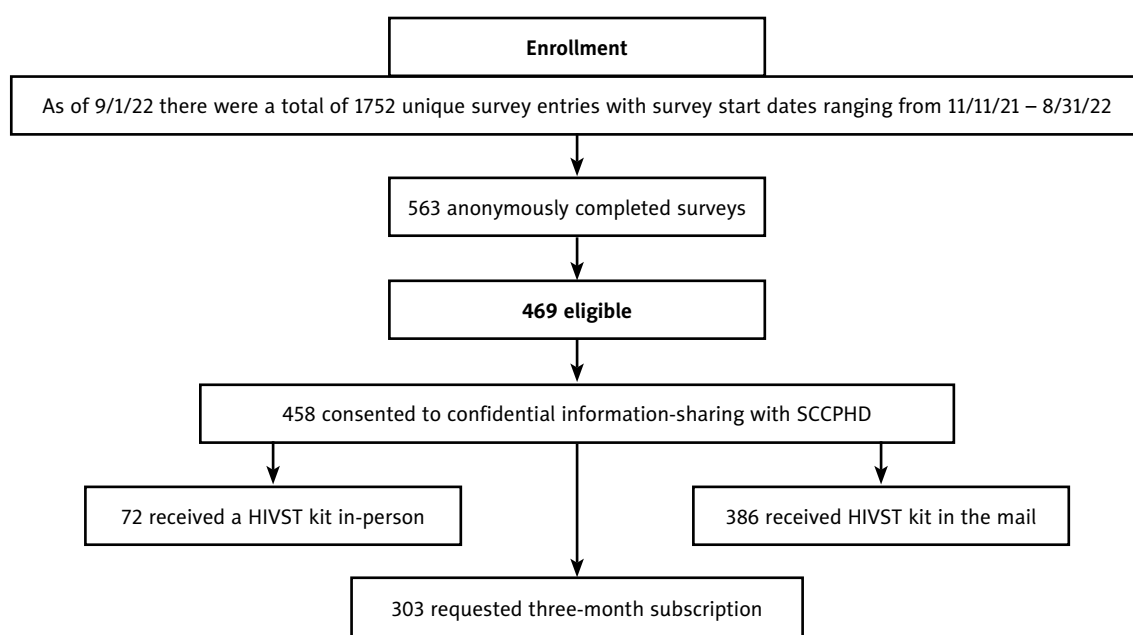


Figure 2. County of Santa Clara Public Health Department HIV self-testing program workflow



**Figure 3.** Consort diagram of HIVST program participation

Revisions were made to individual survey items according to pilot test feedback. Reliability using a test-retest process was measured, where we asked the same individuals to complete the surveys again at a different time, and compared responses from both instances to determine consistency of responses.

## Procedures

In September 2022, all survey responses were exported from Qualtrics and safely secured using an encrypted connection within SCCPHD servers. Our study team cleaned raw data by removing all incomplete and duplicate entries. Duplicates were identified as having identical first and last name and e-mail address. The final descriptive analysis included responses from 458 individuals who met eligibility criteria and consented to share their information with the local health department (Figure 3).

## Results

Between November 2021 and August 2022, a total of 458 eligible individuals received an HIVST kit and of these, 303 (66%) requested to be added to a three-month subscription, which allowed them to receive a free test kit every three months. Of those who received an HIVST kit, 38% identified themselves as MSM, 29% identified as members of LGBTQ+ community, 19% as Hispanic/Latinx, 8% as non-binary or genderqueer, 5% as Black/African ancestry, and 2% identified themselves as people who inject drugs (PWID). A majority (77%) of the participants identified themselves as males (Table 1). When asked about PrEP knowledge and behaviors, a total of 271 (70%) participants

had heard of PrEP, but had not taken it, 42 (11%) did not know what PrEP is, 40 (10%) had taken PrEP in the past but stopped taking it, and 33 (9%) were currently taking PrEP. The individuals were asked whether they would like to learn more about PrEP. A total of 457 responses were received for this question and of those, 72 (16%) indicated interest in learning more about it (Table 1). When asked when the individuals were last tested for HIV, 232 (51%) responded. Of these, 55% had either not been tested in over a year, never been tested before (21%), and could not recall or preferred not to answer. A total of 232 (51%) participants indicated their reasons for selecting this program. Of these, 135 (58%) stated convenience, 82 (35%) indicated that their schedule limitations in accessing in-person testing services, 75 (32%) specified confidentiality reasons, 68 (29%) stated reasons due to the COVID-19 pandemic, 37 (16%) indicated not being able to get to the test site(s) near them, and 24 (10%) had poor/unsatisfactory experiences at the test site(s) near them (Table 2). Finally, with regards to understanding effective methods to raise program awareness, we found that a total of 200 (43%) participants had heard about the program through a social marketing advertising campaign launched between April 1 and May 15, 2022 (Figure 1). The social marketing advertising campaign was launched within the SF Bay Times and Instinct Gay Magazines as well as the Grindr and Adam4Adam dating applications. Of these platforms, Grindr had the highest reach with 433 survey link clicks and 125 completed surveys. Over this 10-month study period, the fact that 43% of all the individuals sought this program during the three-week social marketing advertising campaign indicated that

**Table 1.** Participants' demographics and various HIVST survey responses

Variable	Survey responses
Sex assigned at birth ( <i>n</i> = 232)	
Male	81.90%
Female	14.22%
Other or prefer not to answer	3.88%
Gender identity ( <i>n</i> = 232)	
Male	76.72%
Female	12.50%
Transgender or genderqueer or non-binary	7.32%
Other or prefer not to answer	3.42%
Ethnicity ( <i>n</i> = 232)	
Non-Hispanic or Latinx	43.97%
Hispanic or Latinx	37.50%
Other or prefer not to answer	18.53%
Race ( <i>n</i> = 232)	
White/Caucasian	30.95%
Asian	26.59%
Prefer not to answer	14.29%
Other	13.10%
Black/African ancestry	8.33%
American Indian/Alaskan Native	5.16%
Native Hawaiian/Pacific Islander	1.59%
Last HIV test ( <i>n</i> = 232)	
More than 12 months	25.00%
I have never been tested	21.12%
1 to 3 months	15.52%
4 to 6 months	15.52%
7 to 12 months	9.05%
Do not know/Do not remember	6.03%
Less than one month	4.31%
Prefer not to answer	3.45%
Previous injection drug use history (non-prescribed; <i>n</i> = 232)	
No	93.97%
Yes	6.03%
Substance use history over past 12 months ( <i>n</i> = 81)	
Marijuana	34.62%
None of the above	28.85%
Amphetamines (meth, MDMA)	18.27%
Cocaine or crack	8.65%
Other or prefer not to answer	6.73%
Opioids (heroin, fentanyl, other painkillers)	2.88%

**Table 1.** Cont.

Variable	Survey responses
Needles or injection equipment sharing history over the past 12 months ( <i>n</i> = 72)	
No	55.56%
I do not use needles	36.11%
Yes	8.33%
HIV test kit mailing subscription ( <i>n</i> = 458)	
Yes	66.16%
No	33.64%
Past or current knowledge about HIV PrEP ( <i>n</i> = 386)	
No, I have never taken PrEP but have heard of it	70.21%
I do not know what PrEP is	10.88%
Yes, I took PrEP in the last 12 months but stopped	10.36%
Yes, I am currently taking daily PrEP	8.55%
Request for PrEP navigation services ( <i>n</i> = 457)	
No, not at this time	59.08%
No, I will contact you	25.16%
Yes, I would like to be contacted to learn more about PrEP	15.75%

this is a highly effective method for increasing awareness and uptake of this program.

When compared with the three-week period before campaign launch, the health department recorded 20 completed surveys. After the three-week social marketing campaign, the health department recorded 210 completed surveys, a 10.5 time pre-campaign increase. We also observed an 8-fold increase in HIV PrEP inquiries before and after this campaign, where during the three-week period before the campaign, we received one inquiry for PrEP and during the campaign, there were 33 inquiries received. Finally, 197 (42%) individuals heard about the program through the local health department website, Getting to Zero newsletter, and community-based organization promotions. A total of 72 (16%) individuals received their test kit directly from the health department through limited in-person outreach events.

## Discussion

The results of this study confirm the overall benefits of HIVST programs, such as reducing barriers to HIV testing and facilitating community access to testing in a location that is secure, private, and safe for an individual. While all outreach methods collectively helped increase HIVST program reach and uptake, the social marketing and

**Table 2.** Reasons for choosing HIVST

Response	Count (n = 232)	Percentage*, %
Convenience	135	58.19
My schedule conflicts when testing is available	82	35.34
I do not want people to know I am getting tested	75	32.33
Because of the current pandemic	68	29.31
I do not know where I can get tested	52	22.41
Traveling to the nearest test site takes too long	50	21.55
I cannot get to the test site(s) near me	37	15.95
I want to use the test with my partner(s)	34	14.66
Poor/ unsatisfactory past experiences at test site(s) near me	24	10.34
I am homebound	11	4.74
Other (specify)	8	3.45
I do not have childcare	4	1.72
None of the above	4	1.72

\*Total percentage does not equal 100 as individuals could select more than one option.

in-person outreach approaches were most effective during the COVID-19 pandemic. Our social marketing campaign results further aligned with the awareness to action model [30-32], where our campaign yielded almost 8 million total impressions (“awareness”), 63,000+ clicks (“interest”), 750+ health department page visits (“decision”), and 200 survey completions (“action”) among our priority populations. While limited in-person outreach efforts resumed at community events, these efforts yielded a significant number of HIVST sign-ups that otherwise would not have occurred. This indicates that in-person outreach efforts, even when conducted in a limited capacity, can be an effective way to reach certain sub-sets of the population, and can further provide means to engage with a health professional that may feel less stigmatizing, welcoming, and needs-based rather than a requirement to receive or perform an HIVST [33-35]. Other HIVST programs found community-based distribution to be a successful method for widespread HIVST distribution; although there is dependence on the quality of evidence available [36-38]. This method could be incorporated in future awareness efforts to better understand the local impact. Overall, this program was successful in reaching individuals during a time when in-person services were limited and/ or halted due to COVID-19, and for those who did not feel comfortable going into a clinical testing facility due to fear of COVID-19 exposure (Figure 3).

We also observed a drastic increase in the number of HIV PrEP inquiries that had previously reduced significantly during the pandemic. This increase would not only prevented HIV transmission and linked positive individuals to care, but it may also lead to hundreds of thousands of lifetime savings for an individual and among healthcare systems, if even one of the 33 individuals who inquired about PrEP was able to access it and could stay

on it for as long as they be at risk of acquiring HIV [39]. For perspective, the average cost adjusted for inflation for a lifetime of HIV treatment is \$512,146 [40]. In contrast, a PrEP prescription can add up to over \$21,000 annually, or \$210,000 over 10 years if purchased without insurance or other payment programs [41, 42]. Given this, each HIV infection that is averted saves more than \$400,000 in total lifetime costs, which is more than what the average cost of a social marketing campaign would cost health departments per year.

Our local program also observed high acceptability of this program given the volume of survey responses that came in over the 10-month period [43]. During the COVID-19 pandemic, the CDC emphasized an urgent need to scale-up HIVST programs across all jurisdictions in the United States due to being important tools to achieve the goals of Getting to Zero and ending the HIV epidemic. Our participants confirmed that the pandemic was one of the key reasons for the increase in our local uptake of HIVST [44]. Like other health departments, such as the Virginia and Arizona Departments of Public Health, our health department was also able to reach people who had never been tested or not been tested recently for HIV through this program [45, 46].

Finally, HIVST can further play a critical role in reducing social, structural, and systemic barriers to access testing, especially among priority populations. Due to our eligibility criteria, we were able to ensure available test kits were selected for priority populations who may otherwise face barriers accessing testing options or those with high-risk behaviors. We utilized an integration model to ensure that the option for self-testing was available even to patients who arrived for in-person testing or related clinical services. Furthermore, we took measures to educate our providers and community-based organizations about this testing option to increase

awareness and uptake. It is likely that these efforts positively influenced our results [46].

A specific barrier to the in-person testing option was that the participants were not satisfied with the services they received through other local clinics (Table 2). Such challenges could be exacerbated by long clinic wait time, limited healthcare provider availability, and hours of operation, especially during the COVID-19 pandemic [44]. As such, we believe that this self-testing option reduces transportation barriers and overall improves the access to the service itself, while eliminating the need to engage with a healthcare provider [46]. Given that our HIVST program participants expressed discomfort in other people knowing about their interest in getting an HIV test, HIVST programs may reduce stigma, a factor that continues to play a significant role in discouraging an individual's access to HIV prevention and care services [47, 48].

## Strengths

A key strength of the study is that we evaluated several outreach methods employed to increase program awareness, which can be used to inform future programming. We also engaged in a rigorous survey development process that involved collaboration with multiple stakeholders to set eligibility screening processes, identify priority populations, and ensure multiple rounds of pilot testing to measure validity and reliability. We further reached the priority populations most at-risk for HIV through this program, reduced barriers that individuals may otherwise face while accessing in-person testing services, and identified an increased number of patients for PrEP linkage.

## Limitations

A limitation of this study was self-reported survey responses, which could provide an under- or overestimation of the reported statistics. In addition, some survey responses were optional and therefore had a lower rate of responses compared with those that were mandatory. While this limits the generalizability of our study results, it does highlight the need for larger scale studies, especially those comparing HIV testing and PrEP initiation rates before and after the COVID-19 pandemic.

## Conclusions

The HIVST program introduced a novel way to test for HIV in Santa Clara County during COVID-19. This study illustrates a robust way of reaching individuals, who may have not otherwise tested for HIV, especially during the COVID-19 pandemic. The program has the potential to be a more accessible, feasible, and acceptable way of testing for HIV. Our promotional efforts included social media and in-person outreach efforts, both of which are effective with

increasing program reach. Healthcare providers are encouraged to offer HIVST as an option to their patients.

## Declaration of funding

This program was supported by funding from the Centers for Disease Control and Prevention PS18-1802 HIV Integrated Prevention and Surveillance grant passed through the California Department of Public Health.

## Ethical statement

This study was exempt from an Institutional Review Board review.

## Conflicts of interest

The authors declare no conflict of interest.

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