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## Informing California's Plan to Enhance HIV Screening in the Ending the HIV Epidemic Initiative

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### Abstract

The CDC recommends that everyone have at least one HIV test in their lifetime. However, analyses of California Health Interview Survey data showed that in 2017 only half of Californians had ever received an HIV test. Non-Hispanic black (64.8%) and Hispanic adults (54.7%) had higher lifetime testing rates than non-Hispanic white adults (48.8%). In multivariate analysis, non-Hispanic white adults had twice and Hispanic adults 1.2 times the odds of lifetime HIV testing as non-Hispanic white adults. The CDC recommends annual HIV testing for higher-risk individuals. Independent of race/ethnicity, heterosexual men with multiple sex partners had lower annual testing rates than other high-risk individuals. Annual testing was unrelated to education level and poverty, but was related to number of doctor visits. HIV screening rates among heterosexual men with multiple partners could be increased by targeting HIV screening to non-medical settings in California's eight Ending the HIV Epidemic counties.

### Keywords

Lifetime HIV testing; Annual HIV testing for those at elevated risk; End the Epidemic; PrEP; California

### Introduction

New HIV prevention strategies, such as pre-exposure prophylaxis (PrEP), post-exposure prophylaxis (PEP) and Treatment as Prevention (TasP) have enabled the United States to make considerable progress in reducing the annual number of new HIV infections. Although the number of annual new infections dropped from 47,500 in 2008 to 38,000 in 2014, the number has remained stubbornly above 35,000 (36,400 in 2018 and 35,924 in 2019). (Centers for Disease Control and Prevention, 2012, 2019, 2020b, 2021).

To accelerate the use of effective strategies like PrEP, PEP and TasP in the areas and communities most affected by HIV, the federal government launched a new ten year initiative called, "Ending the HIV Epidemic: A Plan for America (EHE)" (U. S. Department of Health and Human Services, 2019). The goal of this plan is to reduce the number of new

HIV infections by 75% by 2025 and 90% by 2030. The initiative will initially focus efforts in 48 counties, Washington, DC, San Juan (PR), and seven states with substantial rural HIV burden. Eight of these targeted efforts are in California.

As part of the EHE, the Centers for Disease Control and Prevention (CDC) will provide additional resources to state and local health departments in all 57 jurisdictions to develop and implement their local plans (CDC, 2020a). To launch the program, the CDC awarded \$109 million to state and local health departments to support their efforts to undertake a series of initiatives. A key pillar of these initiatives is to diagnose all people with HIV as early as possible. Increased HIV testing will diagnose people living with HIV (PLWH) at an early stage so they can begin treatment, which lowers viral load and reduces the risk of transmitting the virus by up to 96% (Cohen et al., 2011). Indeed, PLWH who are unaware of their infection are estimated to be responsible for nearly half of all new HIV infections each year (Hall, Holtgrave, & Maulsby, 2012). Testing will also identify uninfected persons at high risk for acquiring HIV, who can then be offered PrEP.

To facilitate initiating treatment for the 14% of PLWH who are unaware of their infection, the CDC recommends that all patients between the ages 13 and 64 in medical settings where undiagnosed HIV infection equals or is greater than 0.1% be screened for HIV at least once in their lifetime as part of a routine health examination (CDC, 2006; CDC, 2018). The U.S. Preventive Services Task Force (USPSTF), which is an independent and volunteer panel of experts nationwide who provide evidence-based recommendations for clinical preventive services in the US (USPSTF, 2019a), recently reaffirmed its A rating for HIV screening (USPSTF, 2019c). Thus, under the provisions of the Affordable Care Act (ACA), health insurance plans in the exchanges must cover the test with no patient cost-sharing (USPSTF, 2019b). Both the CDC and the USPSTF recommend annual screening for men who have sex with men (MSM) (DiNunno et al., 2017; USPSTF, 2019c). The CDC recommends more frequent screenings (every 3 to 6 months) for all persons at higher risk of HIV infection, including MSM (CDC, 2018). HIV screening of all patients has been found to be cost-effective relative to targeted or diagnostic HIV testing even in low-HIV prevalence medical settings (Long, Brandeau, & Owens, 2010; Nosyk et al., 2018; Paltiel et al., 2005).

Despite these recommendations, nationally, only 39% of adults over the age of 17 had ever received an HIV test (Pitasi et al., 2019). Even many persons at elevated risk for HIV fail to have an annual screening (Pitasi et al., 2018). The National Survey of Family Growth found that between 2006 and 2010, only 43% of women and 34% of men who reported sexual and drug use behaviors that put them at risk for HIV infection had received an HIV test within the past year (Chandra, Billioux, Copen, & Sionean, 2012).

The CDC, in partnership with state governments, has made significant efforts to enhance access to HIV testing nationally, but the CDC estimates that 13% of the estimated 146,700 Californians living with HIV in 2018 did not know their status (CDC, 2020c) despite the lowering of barriers to HIV screening by no longer recommending that written informed consent and counseling be required to conduct HIV screening in a medical setting (California Department of Public Health, 2016).

In order to inform California's efforts to increase HIV testing through the EHE, the purpose of this paper is to examine individual-level factors related to adherence to the CDC HIV testing guidelines among Californians at risk for HIV infection. Our specific research questions are:

1. What percentage of adults in California have ever been tested for HIV?
2. What individual-level factors relate to the likelihood of ever being tested for HIV?
3. What percentage of respondents with high-risk behaviors (MSM, transgender persons and individuals with more than one sex partner in the past 12 months) have had an HIV screening test in the past 12 months, as recommended by the CDC?
4. How does past year testing differ for those at highest risk?

## Methods

### Data and Sample

Data were obtained from the California Health Interview Survey (CHIS), a population-based random digit dialed survey of California's residential, non-institutionalized population aged 18 and older (CHIS, 2017). CHIS respondents reported on their health status, health conditions, health-related behaviors, health insurance coverage, access to healthcare services, and other health-related issues. This study was approved by university IRB #18001474, expiration 11/16/2021.

Data on lifetime HIV testing were available only for all adults in the 2017 cycle of CHIS (n=21,150). In the 2013-2016 CHIS cycles, questions about HIV testing were asked only of those deemed to be a higher risk of acquiring HIV (n=2,557). In line with the CDC recommendations, the survey inquired about testing in the past year. In this paper, past year refers to the past 12 months. Higher risk groups include respondents who reported being a man who has sex with men (MSM) or identifies as transgender - both groups who continue to be disproportionately affected by HIV (CDC, 2015). In addition, cisgender women and heterosexual cisgender men with more than one sex partner in the past year were also defined as being at higher risk for HIV infection, as having a greater number of partners may also increase risk (Patel et al., 2014). While injection drug use is also considered a major risk factor for HIV infection (Patel et al., 2014), this was not asked about in the survey and thus was not included as part of our criteria for identifying those at high risk for HIV.

### Outcome Variables

Lifetime HIV testing status was assessed for all respondents in the 2017 CHIS cycle. All respondents were then asked whether they had ever been offered an HIV test. All respondents who reported ever being tested were additionally asked if their provider had offered them the test or if they had to ask their provider for it.

In order to increase sample size to examine annual testing for those at higher risk for HIV infection, we combined data from the 2013-2016 CHIS waves.

## Conceptual Model and Independent Variables

A conceptual model of the determinants of medical care utilization suggests three broad categories of variables that affect HIV testing (Andersen, 1995). These include need, enabling, and predisposing factors.

**Need** for testing is greater where the probability of HIV infection is greater. It is well established that, compared to the general population, HIV risk is high among MSM and transgender persons as well as heterosexual individuals with multiple sex partners (CDC, 2015; Patel et al., 2014). Using data on sex at birth, sexual orientation, gender identity and number of sex partners in the past year, we constructed five mutually exclusive groups that categorize HIV sexual risk and therefore the need for testing. MSM and transgender persons constituted the first high-risk group, heterosexual cisgender men with more than one sex partner constituted a second high-risk group, and cisgender women (including heterosexual, gay, or bisexual) (hereafter “women”) with more than one sex partner in the past year were a third high-risk group. Heterosexual men and women with fewer than two sex partners in the past year constituted two low-risk groups.

**Enabling** factors are measures that facilitate access to medical services including health insurance coverage in the past 12 months (i.e., coverage throughout past 12 months, fewer than 12 months of coverage in the past year, or uninsured throughout past 12 months). Since the CDC’s efforts to promote HIV testing have focused on testing in medical settings, we measured exposure to medical settings by assessing the number of outpatient visits respondents had in the past year and whether they reported any hospitalization or ER use in the past year. The analyses for past year testing included year of survey administration in order to detect time trends in testing behavior.

**Predisposing** demographic factors include age, ethnicity/race, highest level of education completed, and citizenship status. Age was categorized into four groups (18-25 (reference group), 26-45, 46-64, and 65+). Ethnicity/race categories included persons of Hispanic descent, non-Hispanic white (reference group), non-Hispanic black/African American, non-Hispanic Asian, and other/mixed groups of non-Hispanic origin. We coded respondents whose income fell below the Federal poverty line as “poor”.

## Statistical analysis

To examine how HIV testing behavior conforms to the CDC recommendation that all adults receive at least one lifetime HIV test, we calculated the proportion of adults who reported ever receiving an HIV test. We used Chi-square tests to examine associations between need, enabling, and predisposing characteristics for the whole sample using data from the 2017 CHIS wave. Multivariable logit regressions related any lifetime HIV test to the independent variables. Unlike demographic characteristics such as gender or ethnicity, some measures were available only for the past year (e.g., number of sex partners; insurance status). These are included in the logit regressions because of their relationship to measures of these variables for prior dates that are not observed. Survey weights were used to obtain state level estimates and account for the complex survey design.

From the 2013-2016 CHIS waves, we calculated the proportion of individuals at higher risk of HIV who had an HIV test in the past year. Those who had already been diagnosed with HIV were excluded from the analysis. We used Chi-square tests to examine how annual testing related to the independent variables. Multivariable logit regressions estimated the net effect of each independent variable on the odds of testing in the past year. All analyses were conducted with SAS 9.4.

## Results

### Lifetime Testing for HIV

Table 1 presents descriptive and bivariate results for lifetime HIV testing among adults in California. In 2017, half (49.8%) of California adults who were not known to be HIV positive reported ever having received an HIV test (Table 1, Columns 1-3). Testing differed by ethnicity/race ( $p<.001$ ), with the greatest proportions occurring among non-Hispanic black individuals (64.8%), followed by persons of Hispanic heritage (54.7%) and non-Hispanic white individuals (48.8%). Fewer than one third of non-Hispanic Asian persons had ever had an HIV test (32.4%). Testing also differed by age ( $p<.001$ ), with the greatest proportion among persons aged 26-45 (63.2%) and 46-64 (55.4%), while smaller percentages of persons aged over 65 (25.4%) or under 26 (37.8%) reported ever having had an HIV test.

Lifetime testing probability was strongly related to risk group and number of sex partners in the past year ( $p<.001$ ). As expected, MSM and transgender persons had high (but not universal) proportions of lifetime HIV testing (75.1%). Among heterosexual men, greater percentages of those at higher risk for HIV due to having multiple sex partners had ever been tested for HIV (62.7%) compared to those with one or no sexual partners in the past year (44.4%). Three quarters of women who had multiple sex partners had ever been tested (76.2%) compared to 49.3% for those without multiple partners.

Respondents who were covered by health insurance part of the year had the highest proportion of ever testing in their lifetime (58.6%) compared to those insured all year (49.3%) and those uninsured all year (49.4%) ( $p=.017$ ). Greater proportions of those with no doctor visits in the past year had ever been tested (44.7%) compared to those with 1 to 5 doctor visits in the past year (30.7%) and those with more than 5 visits in the past year (11.1%) ( $p=.004$ ). A somewhat but not significantly greater percentage of individuals with a hospital stay or an ER visit in the past year had a lifetime HIV test (55.1%) compared to those who had not (48.1%) ( $p=.054$ ). Neither education, citizenship, nor current poverty status was significantly related to lifetime HIV testing.

Lifetime testing was modest even among respondents with current behaviors that expose them to risk of infection (Table 1, Columns 4-6). Within the higher risk groups, ethnicity/race ( $p=.025$ ), age ( $p=.003$ ), and number of doctor visits in the past year ( $p=.0003$ ) were significantly associated with reports of ever being tested. Non-Hispanic black individuals had the highest proportion of lifetime testing (86.2%). The youngest (58.0%) and oldest (58.8%) respondents reported lower lifetime testing odds. Greater number of doctor visits in

the past year were associated with greater likelihood of ever getting tested relative to those with no visits.

Table 2 presents the multivariable logit results for lifetime HIV testing among adults in California. The multivariable analysis of lifetime testing shows that among all adults, both women and heterosexual men without reported risk factors for HIV had significantly lower odds of having a lifetime HIV test than MSM and transgender individuals ( $p < .05$ ) (Table 2, Column 1). Net of other factors, non-Hispanic black adults had twice the odds of reporting a lifetime HIV test as compared to non-Hispanic white adults ( $p < .001$ ). Non-Hispanic Asian adults had less than half the odds of reporting ever receiving an HIV test as non-Hispanic white adults ( $p < .001$ ). Hispanic adults were 1.2 times as likely as non-Hispanic white adults to ever have been tested for HIV ( $p < .05$ ). The multivariable results confirm significantly less lifetime testing among the youngest and oldest respondents compared to white non-Hispanic adults ( $p < .001$ ). Greater number of doctor visits in the past year was also associated with ever being tested for HIV. Those who had 1 to 5 doctor visits in the past year were 1.3 times as likely ( $p < .001$ ) and those who had 6 or more doctor visits in the past year were 1.8 times as likely as those who did not have any ( $p < .001$ ). Education, poverty status, citizenship status, current health insurance coverage, any overnight hospital stay or ER visit, and number sex partners in the past year had no statistically significant, independent impact on lifetime testing. Limiting the analysis to adults with higher risk behaviors in the past year yielded similar results (Table 2, Column 2).

### Annual Testing Among Higher Risk Individuals

Table 3 presents descriptive and bivariate results for past year HIV testing among high-risk adults in California. Among persons at higher risk for HIV, 69.4% reported an HIV test in the past year, with higher proportions of youth reporting testing (86.8%) and lower proportions of adults 65 and older (42.7%) (Table 3, Columns 1-3). As expected, MSM and transgender persons had high (but not universal) proportions of HIV testing within the prior year (75.1%) (Table 3, Columns 4-6). Although three quarters of women who had multiple sex partners reported testing (75.3%) (Table 3, Columns 10-12), only 63.2% of heterosexual men with multiple sex partners had tested in the past year (Table 3, Columns 7-9). There were significant age differences across each of the three risk groups ( $p < .01$ ). Although testing differed by ethnicity/race for the entire high-risk group ( $p = .045$ ) with non-Hispanic white adults having the lowest proportion (63.1%), no significant difference was found within each high-risk group. Health insurance coverage was only significantly associated with past year testing for high-risk heterosexual men ( $p = .040$ ). Similarly, the number of doctor visits in the past year was only significant for high-risk women ( $p = .019$ ) and high-risk heterosexual men ( $p = .025$ ), and any overnight hospital stay or ER visit in the past year was only significant for MSM and transgender persons ( $p = .038$ ). Past year testing was significantly associated with greater number of sex partners in the past year for each high-risk group ( $p < .001$ ) except for high-risk women.

Table 4 presents multivariable logit results for past year testing among high-risk adults. When other factors are taken into account, MSM and transgender individuals have greater odds of testing than either heterosexual men with multiple partners ( $p < .001$ ) or women

at risk due to having multiple sex partners ( $p < .001$ ) (Table 4, Column 1). Testing was significantly greater for those who had more than one sex partner in the past year ( $p < .001$ ). Among all respondents at higher risk, persons with Hispanic heritage had nearly twice the odds ( $p < .05$ ), non-Hispanic black individuals had more than twice the odds ( $p < .05$ ), and non-Hispanic Asian individuals had nearly three times the odds of testing in the past year compared to non-Hispanic white individuals net of other factors ( $p < .05$ ). Surprisingly, younger respondents (aged 18-25) were more likely to report an annual test than any other age group ( $p < .001$ ). Those who had at least one doctor visit in the past year were three times more likely to have been tested for HIV in the past year than those who did not have any and the odds increased as the number of doctor visits increased ( $p < .001$ ). Neither poverty, education, citizenship status, health insurance coverage, nor any overnight hospital stay or ER visit were significantly related to recent testing among the high-risk groups. Testing did not vary significantly over time once other factors were controlled. Results were similar when stratified by each risk group although the wide confidence intervals for some the variables suggest the presence of inadequate cell sizes.

## Discussion

The United States is launching a national initiative called “Ending the HIV Epidemic: A Plan for America,” to reduce the number of new HIV infections by 75% within five years and by 90% within 10 years (U. S. Department of Health and Human Services, 2019). Our analysis contributes information on HIV testing in California, where eight counties have been targeted to receive additional resources to reduce HIV incidence. HIV testing will be a necessary component of the strategy to end the AIDS epidemic by linking those who are HIV positive to care and by providing PrEP to those at high risk for HIV.

Our analysis found large gaps between reported testing among adults in California and the recommendations posed by the CDC. In particular, fewer than half (49.8%) of adults in California reported receiving an HIV test in their lifetime. This is just slightly higher than the national average of 46% for lifetime HIV testing in 2017 (Kaiser Family Foundation, 2019). Respondents with behaviors that put them at risk for HIV infection exhibited greater adherence to the CDC’s recommendation for annual testing, but these estimates were less than universal and have not increased significantly over time despite the efforts of the CDC and the state of California. Three-quarters of MSM and transgender persons, as well as high-risk women with multiple sex partners reported HIV testing within the past year. However, testing among heterosexual men with multiple partners was lower (63.2%). Perhaps men do not perceive that having multiple partners increases their risk for acquiring HIV and need for testing compared to the general population due to their perception that HIV only affects MSM and transgender individuals (Khawcharoenporn, Kendrick, & Smith, 2012; Taylor et al., 2014). Their lower testing rates may also reflect that the risk of acquiring HIV is lower for the insertive partner.

Another source of the difference in HIV testing between men and women with multiple partners may lie in differential exposure to medical care. Women generally use medical care more frequently than men (Bertakis, Azari, Helms, Callahan, & Robbins, 2000; Vaidya, Partha, & Karmakar, 2012) providing more opportunities for them to be tested. Across



all high-risk groups, we found that greater number of doctor visits was associated with greater probability of getting tested in the past year. However, the magnitude of the effect was smallest for high-risk heterosexual men compared to high-risk women and MSM and transgender persons. We also found that MSM who were hospitalized or used the ER had significantly greater odds of testing, but this was not the case for heterosexual men or women with multiple sex partners. Medical care system testing is consistent with our finding that high-risk heterosexual men were significantly less likely to test. However, enabling factors, such as poverty status and health insurance coverage, were not significantly related to HIV screening in the multivariate analyses of annual testing among the high-risk groups.

The lack of relationship between testing and enabling factors such as hospital admission and ER use suggest that there are missed opportunities to provide an HIV test. This is supported by the fact that over three quarters (77.6%) of high-risk respondents in 2017 who had never been tested also reported that they had never been offered testing. This was true among MSM and transgender respondents (75.0%). Consistent with men's lower use of medical care compared to women (21.3% of high-risk men vs. 10.3% of high-risk women in our 2017 sample reported no doctor visits in the past year), 80.8% of high-risk heterosexual men who had never been tested also had never been offered an HIV test while 72.9% of high-risk women who had never been tested also had never been offered an HIV test. Among high-risk individuals who did receive an HIV test at least once in their lifetime, nearly two-thirds (65.1%) had asked their provider for the test rather than wait for it to be offered to them. Thus, educating providers about the need for testing among patients with risk behaviors, including women and heterosexual men with multiple sex partners, is an important strategy to pursue. The data also suggest that patients can take a more active role by asking to be tested.

One strategy for enhancing proactive, health-seeking behavior and improving testing norms is to increase dissemination of the benefits and availability of HIV testing within communities. Higher testing rates in communities with greater prevalence of HIV, such as among African Americans, MSM, and transgender persons (Pitasi et al., 2019), and the lack of a relationship between educational level and the likelihood of HIV testing suggests that social networks may provide an effective means of communication.

Younger adults might be expected to be less well-informed about HIV, since they have accounted for an increasing share of HIV incidence (CDC, 2019). Nonetheless, we found that young adults aged 18-25 were more likely to report HIV testing in the past year than other age groups, controlling for other risk factors.

## Limitations

A limitation of this study is the lack of information on injection drug use among the survey respondents, which is a major risk factor for HIV (Patel et al., 2014). This is a smaller limitation in the California context than it might be in other states because injection drug use was the sole transmission category for only 3.7% of all newly diagnosed men with HIV and 13.4% of newly diagnosed women in California in 2019 (California Department of Public Health, 2021). Further, our study lacked data on perceived risk and unprotected sex. Rather, sexual risk of HIV infection is inferred from self-report of MSM and transgender status and

by having multiple sex partners. Direct information on unprotected sexual activity were not available in these data, but evidence from the National HIV Behavioral Surveillance (NHBS) suggests that rates of unprotected sex are high among heterosexual men with multiple sex partners. The NHBS found that 45% of heterosexual men with a casual partner had unprotected sex with a woman (CDC, 2016).

This study uses data that were self-reported in a survey, thus may be subject to reporting error. However, the concordance between testing reported in the California Health Interview Survey (CHIS) and those reported in the nationally representative Behavioral Risk Factor Surveillance System (BRFSS) survey HIV testing behaviors is moderately high among both the general population and high-risk populations (An et al., 2016; Fisher, Reynolds, Jaffe, & Johnson, 2007; Vanable et al., 2009).

Additionally, during the period when the data we used were collected, CHIS respondents were selected by random digit dial and interviewed by telephone. Recognizing that the use of telephone interviews could bias the sample, beginning in 2019, CHIS has used address based sampling, with a random selection of respondents within a household. However, our data are subject to whatever selection bias may resulted from random digit dialing.

## Conclusions

To date, many of the efforts of the CDC to increase HIV screening have focused primarily on removing the barriers to testing in clinical settings. Removal of the requirement for specific written informed consent for HIV testing in medical settings has no doubt increased HIV screening as a part of routine medical care. However, these changes do not impact testing among groups, such as young, heterosexual men, who do not regularly access formal medical care. The lack of evidence of increased testing over time for persons most at risk suggests the need to look beyond the clinic walls to increase HIV screening in the future. To meet the goals of the End the Epidemic initiative, it will be necessary to enhance existing testing offers and linkage to care outside of medical settings since young men, in particular, may have few interactions with the formal medical care system (Ashman, Rui, & Okeyode, 2019). The CDC has also offered guidance for expanding HIV testing to non-traditional sites, such as at sporting events, gyms, and in barbershops (Wilson et al., 2019). Additionally, the growing emergence of several telemedicine-based companies, including those targeted towards young men such as Roman and Hims just to name a few, may provide additional opportunities for outreach and thus warrant further inquiry on how they may be included in future efforts (Houman, Eleswarapu, & Mills, 2020).

A comprehensive approach to increasing HIV testing for higher risk groups will involve a three-pronged strategy: increasing awareness of the benefits of HIV testing among the population at enhanced risk for HIV; educating providers about their role in increasing HIV testing; and offering HIV testing in non-medical settings since testing lags among men who are not regular users of medical care. The resulting increase in HIV testing will bring more people with HIV into treatment and expand the number of people who can benefit from PrEP.

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**Table 1.**

Any HIV testing in lifetime by sample characteristics among adults in CA ages 18+, 2017.

|                                                 | All                     |                       |                | High-risk               |                       |                |
|-------------------------------------------------|-------------------------|-----------------------|----------------|-------------------------|-----------------------|----------------|
|                                                 | Unweighted total<br>(1) | Percent tested<br>(2) | p-value<br>(3) | Unweighted total<br>(4) | Percent tested<br>(5) | p-value<br>(6) |
| <i>Variables</i>                                |                         |                       |                |                         |                       |                |
| Total (n, %)                                    | 21,150                  | 49.8                  | --             | 2,063                   | 70.1                  | --             |
| Age (n, %)                                      |                         |                       | <0.001         |                         |                       | 0.003          |
| 18-25                                           | 1,906                   | 37.8                  |                | 573                     | 58.0                  |                |
| 26-45                                           | 4,319                   | 63.2                  |                | 729                     | 79.2                  |                |
| 46-64                                           | 6,988                   | 55.4                  |                | 522                     | 75.2                  |                |
| 65+                                             | 7,937                   | 25.4                  |                | 239                     | 58.8                  |                |
| Ethnicity/race (n, %)                           |                         |                       | <0.001         |                         |                       | 0.025          |
| Hispanic                                        | 4,756                   | 54.7                  |                | 612                     | 68.2                  |                |
| Non-Hispanic white                              | 13,303                  | 48.8                  |                | 1,089                   | 73.6                  |                |
| Non-Hispanic black/African American             | 1,048                   | 64.8                  |                | 126                     | 86.2                  |                |
| Non-Hispanic Asian                              | 1,252                   | 32.4                  |                | 116                     | 54.4                  |                |
| Non-Hispanic other or mixed race                | 791                     | 59.9                  |                | 120                     | 75.6                  |                |
| Education (n, %)                                |                         |                       | 0.062          |                         |                       | 0.289          |
| Some high school or less                        | 1,749                   | 50.4                  |                | 139                     | 64.0                  |                |
| Grade 12 or high school diploma                 | 4,354                   | 43.9                  |                | 500                     | 61.1                  |                |
| Vocational school, AA/AS degree or some college | 5,871                   | 51.7                  |                | 596                     | 75.0                  |                |
| BA or BS degree                                 | 5,174                   | 50.1                  |                | 511                     | 72.0                  |                |
| Some graduate school or more                    | 4,002                   | 53.9                  |                | 317                     | 76.7                  |                |
| Poverty: < 100% FPL (n, %)                      |                         |                       | 0.110          |                         |                       | 0.959          |
| Yes                                             | 2,770                   | 53.1                  |                | 309                     | 69.6                  |                |

|                                                         | All                     |                       |                  | High-risk               |                       |                  |
|---------------------------------------------------------|-------------------------|-----------------------|------------------|-------------------------|-----------------------|------------------|
|                                                         | Unweighted total<br>(1) | Percent tested<br>(2) | p-value<br>(3)   | Unweighted total<br>(4) | Percent tested<br>(5) | p-value<br>(6)   |
| <i>Variables</i>                                        |                         |                       |                  |                         |                       |                  |
| No                                                      | 18,380                  | 49.2                  |                  | 1,754                   | 70.2                  |                  |
| Citizenship status (n, %)                               |                         |                       | 0.219            |                         |                       | 0.287            |
| US-born citizen                                         | 17,087                  | 51.2                  |                  | 1,727                   | 72.5                  |                  |
| Naturalized citizen                                     | 2,489                   | 43.3                  |                  | 197                     | 57.9                  |                  |
| Non-citizen with green card                             | 934                     | 53.9                  |                  | 71                      | 77.2                  |                  |
| Non-citizen without green card                          | 640                     | 46.8                  |                  | 68                      | 54.8                  |                  |
| Health insurance coverage in past year (n, %)           |                         |                       | <b>0.017</b>     |                         |                       | 0.425            |
| Insured throughout past 12 months                       | 19,532                  | 49.3                  |                  | 1,781                   | 69.8                  |                  |
| Insured for less than 12 months in past year            | 768                     | 58.6                  |                  | 159                     | 80.4                  |                  |
| Uninsured throughout past 12 months                     | 850                     | 49.4                  |                  | 123                     | 58.8                  |                  |
| No. of doctor visits in past year (n, %)                |                         |                       | <b>0.004</b>     |                         |                       | <b>&lt;0.001</b> |
| 0                                                       | 2,875                   | 44.7                  |                  | 354                     | 56.6                  |                  |
| 1-5                                                     | 12,745                  | 30.7                  |                  | 1,239                   | 69.9                  |                  |
| 6+                                                      | 5,530                   | 11.1                  |                  | 470                     | 82.0                  |                  |
| Overnight hospital stay or ER visit in past year (n, %) |                         |                       | 0.054            |                         |                       | 0.189            |
| Yes                                                     | 5,592                   | 55.1                  |                  | 626                     | 73.9                  |                  |
| No                                                      | 15,558                  | 48.1                  |                  | 1,437                   | 68.4                  |                  |
| No. of sex partners in past year (n, %)                 |                         |                       | <b>&lt;0.001</b> |                         |                       | 0.854            |
| 0-1                                                     | 19,472                  | 47.5                  |                  | 387                     | 72.9                  |                  |
| 2                                                       | 703                     | 68.8                  |                  | 701                     | 68.7                  |                  |
| 3+                                                      | 975                     | 70.1                  |                  | 975                     | 70.1                  |                  |

|                           | All                     |                       |                | High-risk               |                       |                |
|---------------------------|-------------------------|-----------------------|----------------|-------------------------|-----------------------|----------------|
|                           | Unweighted total<br>(1) | Percent tested<br>(2) | p-value<br>(3) | Unweighted total<br>(4) | Percent tested<br>(5) | p-value<br>(6) |
| <i>Variables</i>          |                         |                       |                |                         |                       |                |
| Risk group (n, %)         |                         |                       |                |                         |                       |                |
| <i>High-risk:</i>         |                         |                       | <0.001         |                         |                       | 0.051          |
| MSM or transgender person | 601                     | 75.1                  |                | 601                     | 75.1                  |                |
| Heterosexual man          | 930                     | 62.7                  |                | 930                     | 62.7                  |                |
| Woman                     | 532                     | 76.2                  |                | 532                     | 76.2                  |                |
| <i>Low-risk:</i>          |                         |                       |                |                         |                       | --             |
| Heterosexual man          | 7,763                   | 44.4                  |                | --                      | --                    | --             |
| Woman                     | 11,171                  | 49.3                  |                | --                      | --                    | --             |

Source: CHIS 2017

Note: High risk includes MSM and transgender individuals as well as persons with more than 1 sex partner in the past year.



**Table 2.**

Multivariate logit regressions of lifetime HIV testing among adults in CA ages 18+, 2017.

|                                            | All             | High-risk       |
|--------------------------------------------|-----------------|-----------------|
|                                            | (n=20,997)      | (n=2,063)       |
|                                            | aOR             | aOR             |
|                                            | (95% CI)        | (95% CI)        |
| <i>Variables</i>                           | (1)             | (2)             |
| Risk group (ref=MSM or transgender person) |                 |                 |
| <i>High-risk:</i>                          |                 |                 |
| Heterosexual man                           | 0.563           | 0.543           |
|                                            | (0.213 – 1.489) | (0.209 – 1.410) |
| Woman                                      | 1.138           | 1.037           |
|                                            | (0.364 – 3.556) | (0.341 – 3.154) |
| <i>Low-risk:</i>                           |                 |                 |
| Heterosexual man                           | 0.264 ***       | --              |
|                                            | (0.123 – 0.567) |                 |
| Woman                                      | 0.322 *         | --              |
|                                            | (0.135 – 0.768) |                 |
| No. of sex partners in past year (ref=0-1) |                 |                 |
| 2                                          | 0.883           | 0.955           |
|                                            | (0.232 – 3.363) | (0.268 – 3.406) |
| 3+                                         | 1.038           | 1.109           |
|                                            | (0.275 – 3.912) | (0.338 – 3.637) |
| Age (ref=18-25)                            |                 |                 |
| 26-45                                      | 3.664 ***       | 3.099 ***       |
|                                            | (2.993 – 4.487) | (1.986 – 4.835) |
| 46-64                                      | 2.399 ***       | 2.308 *         |
|                                            | (1.763 – 3.265) | (1.223 – 4.355) |
| 65+                                        | 0.598 ***       | 0.825           |
|                                            | (0.461 – 0.776) | (0.427 – 1.595) |
| Ethnicity/race (ref=Non-Hispanic white)    |                 |                 |
| Hispanic                                   | 1.234 *         | 0.923           |
|                                            | (1.003 – 1.517) | (0.533 – 1.600) |
| Non-Hispanic black/African American        | 2.049 ***       | 2.798 *         |
|                                            | (1.511 – 2.779) | (1.154 – 6.783) |

|                                                                                | <b>All</b>        | <b>High-risk</b> |
|--------------------------------------------------------------------------------|-------------------|------------------|
|                                                                                | <b>(n=20,997)</b> | <b>(n=2,063)</b> |
|                                                                                | <b>aOR</b>        | <b>aOR</b>       |
|                                                                                | <b>(95% CI)</b>   | <b>(95% CI)</b>  |
| <i>Variables</i>                                                               | <b>(1)</b>        | <b>(2)</b>       |
| Non-Hispanic Asian                                                             | 0.417 ***         | 0.468            |
|                                                                                | (0.299 – 0.581)   | (0.214 – 1.022)  |
| Non-Hispanic other or mixed race                                               | 1.362             | 1.305            |
|                                                                                | (0.945 – 1.965)   | (0.413 – 4.125)  |
| Education (ref=Some high school or less)                                       |                   |                  |
| Grade 12 or high school diploma                                                | 0.840             | 1.158            |
|                                                                                | (0.585 – 1.206)   | (0.476 – 2.817)  |
| Vocational school, AA/AS degree or some college                                | 1.059             | 1.796            |
|                                                                                | (0.748 – 1.499)   | (0.563 – 5.728)  |
| BA or BS degree                                                                | 1.063             | 1.515            |
|                                                                                | (0.784 – 1.441)   | (0.550 – 4.170)  |
| Some graduate school or more                                                   | 1.345             | 1.494            |
|                                                                                | (0.962 – 1.879)   | (0.298 – 7.480)  |
| Poverty: < 100% FPL (ref=No)                                                   | 0.870             | 1.029            |
|                                                                                | (0.670 – 1.131)   | (0.317 – 3.341)  |
| Citizenship status (ref=US-born citizen)                                       |                   |                  |
| Naturalized citizen                                                            | 0.880             | 0.628            |
|                                                                                | (0.569 – 1.359)   | (0.242 – 1.631)  |
| Non-citizen with green card                                                    | 1.081             | 1.490            |
|                                                                                | (0.687 – 1.700)   | (0.437 – 5.085)  |
| Non-citizen without green card                                                 | 0.555             | 0.588            |
|                                                                                | (0.213 – 1.446)   | (0.196 – 1.765)  |
| Health insurance coverage in past year (ref=Insured throughout past 12 months) |                   |                  |
| Insured for less than 12 months in past year                                   | 1.171             | 1.769            |
|                                                                                | (0.889 – 1.544)   | (0.556 – 5.623)  |
| Uninsured throughout past 12 months                                            | 0.972             | 0.944            |
|                                                                                | (0.672 – 1.407)   | (0.194 – 4.597)  |
| No. of doctor visits in the past year (ref=0)                                  |                   |                  |
| 1-5                                                                            | 1.337 *           | 1.963 *          |
|                                                                                | (1.008 – 1.773)   | (1.062 – 3.629)  |

|                                                           | <b>All</b>        | <b>High-risk</b> |
|-----------------------------------------------------------|-------------------|------------------|
|                                                           | <b>(n=20,997)</b> | <b>(n=2,063)</b> |
|                                                           | <b>aOR</b>        | <b>aOR</b>       |
|                                                           | <b>(95% CI)</b>   | <b>(95% CI)</b>  |
| <i>Variables</i>                                          | <b>(1)</b>        | <b>(2)</b>       |
| 6+                                                        | 1.807 ***         | 3.253 **         |
|                                                           | (1.353 – 2.413)   | (1.548 – 6.840)  |
| Overnight hospital stay or ER visit in past year (ref=No) | 1.162             | 1.088            |
|                                                           | (0.837 – 1.613)   | (0.532 – 2.226)  |

Source: CHIS 2017

Note: High risk includes MSM and transgender individuals as well as persons with more than 1 sex partner in the past year.

\*  
p<.05

\*\*  
p<.01

\*\*\*  
p<.001

**Table 3.** Past year HIV testing by sample characteristics among high-risk adults in CA ages 18+, 2013-2016.

|                                                | All high-risk |          |         | MSM and transgender persons |          |         | High-risk heterosexual men |          |         | High-risk women |          |         |
|------------------------------------------------|---------------|----------|---------|-----------------------------|----------|---------|----------------------------|----------|---------|-----------------|----------|---------|
|                                                | n             | % tested | p-value | n                           | % tested | p-value | n                          | % tested | p-value | n               | % tested | p-value |
| <i>Variables</i>                               | (1)           | (2)      | (3)     | (4)                         | (5)      | (6)     | (7)                        | (8)      | (9)     | (10)            | (11)     | (12)    |
| Total (n, %)                                   | 2,557         | 69.4     | --      | 712                         | 75.1     | --      | 1,081                      | 63.2     | --      | 764             | 75.3     | --      |
| Age (n, %)                                     |               |          | <0.001  |                             |          | 0.001   |                            |          | <0.001  |                 |          | <0.001  |
| 18-25                                          | 598           | 86.8     |         | 97                          | 91.1     |         | 262                        | 81.9     |         | 239             | 91.9     |         |
| 26-45                                          | 925           | 66.6     |         | 163                         | 83.1     |         | 411                        | 57.4     |         | 351             | 70.7     |         |
| 46-64                                          | 822           | 55.0     |         | 334                         | 63.3     |         | 334                        | 50.8     |         | 154             | 47.5     |         |
| 65+                                            | 212           | 42.7     |         | 118                         | 44.6     |         | 74                         | 39.1     |         | 20              | 59.9     |         |
| Ethnicity/race (n, %)                          |               |          | 0.045   |                             |          | 0.114   |                            |          | 0.275   |                 |          | 0.067   |
| Hispanic                                       | 730           | 72.9     |         | 159                         | 82.1     |         | 338                        | 65.7     |         | 233             | 81.4     |         |
| Non-Hispanic white                             | 1,360         | 63.1     |         | 453                         | 70.5     |         | 517                        | 56.5     |         | 390             | 65.1     |         |
| Non-Hispanic black/African American            | 212           | 74.1     |         | 34                          | 92.5     |         | 109                        | 64.3     |         | 69              | 82.3     |         |
| Non-Hispanic Asian                             | 118           | 78.6     |         | 38                          | 78.1     |         | 55                         | 77.4     |         | 25              | 82.2     |         |
| Non-Hispanic other or mixed race               | 137           | 72.3     |         | 28                          | 43.9     |         | 62                         | 64.2     |         | 47              | 89.8     |         |
| Education (n, %)                               |               |          | 0.320   |                             |          | 0.290   |                            |          | 0.358   |                 |          | 0.519   |
| Some high school or less                       | 179           | 65.5     |         | 32                          | 86.2     |         | 85                         | 57.8     |         | 62              | 67.6     |         |
| Grade 12 or high school diploma                | 613           | 73.2     |         | 129                         | 77.3     |         | 303                        | 66.6     |         | 181             | 85.7     |         |
| Vocational school, A/AS degree or some college | 766           | 70.8     |         | 176                         | 77.5     |         | 325                        | 65.6     |         | 265             | 73.9     |         |
| BA or BS degree                                | 588           | 71.0     |         | 186                         | 80.8     |         | 243                        | 65.1     |         | 159             | 71.9     |         |
| Some graduate school or more                   | 411           | 58.8     |         | 189                         | 62.6     |         | 125                        | 45.2     |         | 97              | 72.7     |         |
| Poverty: < 100% FPL (n, %)                     |               |          | 0.622   |                             |          | 0.637   |                            |          | 0.811   |                 |          | 0.906   |
| Yes                                            | 459           | 71.6     |         | 113                         | 78.1     |         | 161                        | 65.2     |         | 185             | 74.7     |         |

|                                                         | All high-risk |          |         | MSM and transgender persons |          |         | High-risk heterosexual men |          |         | High-risk women |          |         |
|---------------------------------------------------------|---------------|----------|---------|-----------------------------|----------|---------|----------------------------|----------|---------|-----------------|----------|---------|
|                                                         | n             | % tested | p-value | n                           | % tested | p-value | n                          | % tested | p-value | n               | % tested | p-value |
| <i>Variables</i>                                        | (1)           | (2)      | (3)     | (4)                         | (5)      | (6)     | (7)                        | (8)      | (9)     | (10)            | (11)     | (12)    |
| No                                                      | 2,098         | 69.0     |         | 599                         | 74.6     |         | 920                        | 62.9     |         | 579             | 75.5     |         |
| Citizenship status (n, %)                               |               |          | 0.665   |                             |          | 0.704   |                            |          | 0.850   |                 |          | 0.470   |
| US-born citizen                                         | 2,150         | 70.6     |         | 605                         | 76.8     |         | 890                        | 62.9     |         | 655             | 77.6     |         |
| Naturalized citizen                                     | 211           | 65.3     |         | 54                          | 64.7     |         | 100                        | 68.4     |         | 57              | 57.3     |         |
| Non-citizen with green card                             | 108           | 60.2     |         | 25                          | 75.8     |         | 58                         | 56.1     |         | 25              | 62.9     |         |
| Non-citizen without green card                          | 88            | 67.4     |         | 28                          | 72.8     |         | 33                         | 68.9     |         | 27              | 61.4     |         |
| Health insurance coverage in past year (n, %)           |               |          | 0.049   |                             |          | 0.532   |                            |          | 0.040   |                 |          | 0.893   |
| Insured throughout past 12 months                       | 2,009         | 70.7     |         | 599                         | 73.6     |         | 796                        | 65.8     |         | 614             | 75.5     |         |
| Insured for less than 12 months in past year            | 290           | 72.7     |         | 60                          | 80.6     |         | 129                        | 67.3     |         | 101             | 76.7     |         |
| Uninsured throughout past 12 months                     | 258           | 58.2     |         | 53                          | 81.5     |         | 156                        | 47.6     |         | 49              | 71.7     |         |
| No. of doctor visits in the past year                   |               |          | <0.001  |                             |          | 0.054   |                            |          | 0.025   |                 |          | 0.019   |
| 0                                                       | 412           | 50.7     |         | 85                          | 56.7     |         | 115                        | 49.4     |         | 86              | 49.6     |         |
| 1-5                                                     | 1,578         | 74.3     |         | 445                         | 79.0     |         | 427                        | 69.2     |         | 476             | 78.2     |         |
| 6+                                                      | 567           | 74.9     |         | 182                         | 77.2     |         | 122                        | 65.6     |         | 202             | 84.5     |         |
| Overnight hospital stay or ER visit in past year (n, %) |               |          | 0.022   |                             |          | 0.038   |                            |          | 0.173   |                 |          | 0.433   |
| Yes                                                     | 754           | 75.7     |         | 162                         | 86.0     |         | 306                        | 69.5     |         | 286             | 78.4     |         |
| No                                                      | 1,803         | 67.0     |         | 550                         | 72.2     |         | 775                        | 61.0     |         | 478             | 73.5     |         |
| High-risk group (n, %)                                  |               |          | 0.001   |                             |          |         |                            |          |         |                 |          |         |
| MSM or transgender person                               | 712           | 75.1     |         | --                          | --       | --      | --                         | --       | --      | --              | --       | --      |
| Heterosexual man                                        | 1,081         | 63.2     |         | --                          | --       | --      | --                         | --       | --      | --              | --       | --      |
| Woman                                                   | 764           | 75.3     |         | --                          | --       | --      | --                         | --       | --      | --              | --       | --      |

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|                                         | All high-risk |          |         | MSM and transgender persons |          |         | High-risk heterosexual men |          |         | High-risk women |          |         |
|-----------------------------------------|---------------|----------|---------|-----------------------------|----------|---------|----------------------------|----------|---------|-----------------|----------|---------|
|                                         | n             | % tested | p-value | n                           | % tested | p-value | n                          | % tested | p-value | n               | % tested | p-value |
| <i>Variables</i>                        | (1)           | (2)      | (3)     | (4)                         | (5)      | (6)     | (7)                        | (8)      | (9)     | (10)            | (11)     | (12)    |
| No. of sex partners in past year (n, %) |               |          | <0.001  |                             |          | <0.001  |                            |          | <0.001  |                 |          | 0.074   |
| 0-1                                     | 425           | 60.5     |         | 425                         | 60.5     |         | --                         | --       |         | --              | --       |         |
| 2                                       | 970           | 61.3     |         | 91                          | 79.0     |         | 464                        | 51.8     |         | 415             | 70.0     |         |
| 3+                                      | 1,162         | 77.0     |         | 196                         | 94.8     |         | 617                        | 70.8     |         | 349             | 79.8     |         |
| Year (n, %)                             |               |          | 0.784   |                             |          | 0.7367  |                            |          | 0.536   |                 |          | 0.940   |
| 2013                                    | 598           | 69.5     |         | 168                         | 78.3     |         | 267                        | 64.4     |         | 163             | 73.4     |         |
| 2014                                    | 691           | 67.3     |         | 191                         | 77.7     |         | 295                        | 57.8     |         | 205             | 74.3     |         |
| 2015                                    | 626           | 69.8     |         | 166                         | 68.5     |         | 261                        | 65.5     |         | 199             | 77.3     |         |
| 2016                                    | 642           | 72.4     |         | 187                         | 73.8     |         | 258                        | 68.0     |         | 197             | 77.4     |         |

Sources: CHIS 2013-2016

**Table 4.** Multivariate logit regressions of past year HIV testing among high-risk adults in CA ages 18+, 2013-2016.

|                                                                                                                                       | All high-risk<br>(n=2,557)<br>aOR<br>(95% CI) | MSM and transgender<br>persons<br>(n=712)<br>aOR<br>(95% CI) | High-risk<br>heterosexual men<br>(n=1,081)<br>aOR<br>(95% CI) | High-risk<br>women<br>(n=764)<br>aOR<br>(95% CI) |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------|
| <i>Variables</i>                                                                                                                      | (1)                                           | (2)                                                          | (3)                                                           | (4)                                              |
| High-risk group (ref=MSM or transgender person)                                                                                       |                                               |                                                              |                                                               |                                                  |
| Heterosexual man                                                                                                                      | 0.128 ***<br>(0.069 – 0.234)                  | --                                                           | --                                                            | --                                               |
| Woman                                                                                                                                 | 0.208 ***<br>(0.104 – 0.417)                  | --                                                           | --                                                            | --                                               |
| No. of sex partners in past year (ref=0-1 for MSM and transgender persons, ref=3+ for high-risk heterosexual men and high-risk women) |                                               |                                                              |                                                               |                                                  |
| 2                                                                                                                                     | 3.634 ***<br>(1.810 – 7.298)                  | 2.891<br>(0.907 – 9.216)                                     | 0.444 **<br>(0.251 – 0.786)                                   | 0.437 *<br>(0.226 – 0.846)                       |
| 3+                                                                                                                                    | 7.918 ***<br>(4.128 – 15.189)                 | 15.580 ***<br>(5.943 – 40.847)                               | --                                                            | --                                               |
| Age (ref=18-25)                                                                                                                       |                                               |                                                              |                                                               |                                                  |
| 26-45                                                                                                                                 | 0.273 ***<br>(0.163 – 0.457)                  | 0.356<br>(0.070 – 1.810)                                     | 0.278 ***<br>(0.133 – 0.579)                                  | 0.164 ***<br>(0.068 – 0.394)                     |
| 46-64                                                                                                                                 | 0.166 ***<br>(0.097 – 0.287)                  | 0.060 ***<br>(0.014 – 0.253)                                 | 0.302 **<br>(0.126 – 0.727)                                   | 0.064 ***<br>(0.023 – 0.172)                     |
| 65+                                                                                                                                   | 0.083 ***<br>(0.034 – 0.201)                  | 0.033 ***<br>(0.006 – 0.169)                                 | 0.118 ***<br>(0.039 – 0.355)                                  | 0.131 *<br>(0.024 – 0.733)                       |

|                                                 | All high-risk<br>(n=2,557) | MSM and transgender<br>persons<br>(n=712) | High-risk<br>heterosexual men<br>(n=1,081) | High-risk<br>women<br>(n=764) |
|-------------------------------------------------|----------------------------|-------------------------------------------|--------------------------------------------|-------------------------------|
|                                                 | aOR<br>(95% CI)            | aOR<br>(95% CI)                           | aOR<br>(95% CI)                            | aOR<br>(95% CI)               |
| <i>Variables</i>                                | (1)                        | (2)                                       | (3)                                        | (4)                           |
| Ethnicity/race (ref=Non-Hispanic white)         |                            |                                           |                                            |                               |
| Hispanic                                        | 1.792 *<br>(1.061 – 3.027) | 0.959<br>(0.251 – 3.666)                  | 1.691<br>(0.746 – 3.385)                   | 2.032<br>(0.891 – 4.634)      |
| Non-Hispanic black/African American             | 2.163 *<br>(1.180 – 3.965) | 4.586<br>(0.116 – 180.919)                | 1.546<br>(0.693 – 3.451)                   | 4.225<br>(0.948 – 18.831)     |
| Non-Hispanic Asian                              | 2.917 *<br>(1.049 – 8.112) | 2.632<br>(0.715 – 9.695)                  | 3.261<br>(0.770 – 13.814)                  | 3.636<br>(0.082 – 160.468)    |
| Non-Hispanic other or mixed race                | 1.548<br>(0.652 – 3.675)   | 0.112 **<br>(0.022 – 0.575)               | 1.697<br>(0.689 – 4.182)                   | 5.493<br>(0.514 – 58.734)     |
| Education (ref=Some high school of less)        |                            |                                           |                                            |                               |
| Grade 12 or high school diploma                 | 1.145<br>(0.466 – 2.812)   | 0.144<br>(0.013 – 1.594)                  | 1.521<br>(0.468 – 4.941)                   | 1.218<br>(0.268 – 5.538)      |
| Vocational school, AA/AS degree or some college | 0.936<br>(0.423 – 2.071)   | 0.266<br>(0.026 – 2.756)                  | 1.361<br>(0.425 – 4.360)                   | 0.470<br>(0.133 – 1.665)      |
| BA or BS degree                                 | 0.969<br>(0.348 – 2.698)   | 0.213<br>(0.025 – 1.817)                  | 1.281<br>(0.343 – 4.778)                   | 0.531<br>(0.095 – 2.971)      |
| Some graduate school or more                    | 0.587<br>(0.232 – 1.482)   | 0.089 *<br>(0.009 – 0.915)                | 0.658<br>(0.166 – 2.609)                   | 0.538<br>(0.109 – 2.661)      |
| Poverty: < 100% FPL (ref=No)                    | 1.165<br>(0.584 – 2.324)   | 1.829<br>(0.555 – 6.022)                  | 0.966<br>(0.292 – 3.199)                   | 1.437<br>(0.579 – 3.569)      |
| Citizenship status (ref=US-born citizen)        |                            |                                           |                                            |                               |



|                                                                                | All high-risk<br>(n=2,557)   | MSM and transgender<br>persons<br>(n=712) | High-risk<br>heterosexual men<br>(n=1,081) | High-risk<br>women<br>(n=764)  |
|--------------------------------------------------------------------------------|------------------------------|-------------------------------------------|--------------------------------------------|--------------------------------|
| <i>Variables</i>                                                               | aOR<br>(95% CI)              | aOR<br>(95% CI)                           | aOR<br>(95% CI)                            | aOR<br>(95% CI)                |
|                                                                                | (1)                          | (2)                                       | (3)                                        | (4)                            |
| Naturalized citizen                                                            | 0.930<br>(0.440 – 1.966)     | 0.447<br>(0.122 – 1.633)                  | 1.538<br>(0.631 – 3.748)                   | 0.475<br>(0.197 – 2.070)       |
| Non-citizen with green card                                                    | 0.977<br>(0.329 – 2.899)     | 1.921<br>(0.191 – 19.299)                 | 1.225<br>(0.309 – 4.856)                   | 0.467<br>(0.021 – 10.453)      |
| Non-citizen without green card                                                 | 1.246<br>(0.390 – 3.978)     | 0.574<br>(0.036 – 9.263)                  | 2.496<br>(0.233 – 26.772)                  | 0.380<br>(0.062 – 2.323)       |
| Health insurance coverage in past year (ref=Insured throughout past 12 months) |                              |                                           |                                            |                                |
| Insured for less than 12 months in past year                                   | 1.229<br>(0.779 – 1.940)     | 1.104<br>(0.319 – 3.824)                  | 1.070<br>(0.491 – 2.330)                   | 1.677<br>(0.621 – 4.524)       |
| Uninsured throughout past 12 months                                            | 0.759<br>(0.390 – 1.476)     | 1.059<br>(0.146 – 7.697)                  | 0.548<br>(0.229 – 1.311)                   | 1.437<br>(0.408 – 5.060)       |
| No. of doctor visits in the past year (ref=0)                                  |                              |                                           |                                            |                                |
| 1-5                                                                            | 3.529 ***<br>(2.126 – 5.859) | 8.191 **<br>(2.063 – 32.529)              | 2.543 *<br>(1.131 – 5.717)                 | 5.688 ***<br>(2.340 – 13.829)  |
| 6+                                                                             | 4.705 ***<br>(2.374 – 9.325) | 8.508 **<br>(2.358 – 30.702)              | 2.924 *<br>(1.141 – 7.492)                 | 12.909 ***<br>(3.659 – 45.542) |
| Overnight hospital stay or ER visit in past year (ref=No)                      | 0.978<br>(0.603 – 1.588)     | 2.055<br>(0.724 – 5.835)                  | 1.013<br>(0.442 – 2.325)                   | 0.800<br>(0.349 – 1.833)       |
| Year (ref=2013)                                                                |                              |                                           |                                            |                                |
| 2014                                                                           | 0.854                        | 0.978                                     | 0.751                                      | 0.979                          |

|                  | All high-risk<br>(n=2,557) | MSM and transgender<br>persons<br>(n=712) | High-risk<br>heterosexual men<br>(n=1,081) | High-risk<br>women<br>(n=764) |
|------------------|----------------------------|-------------------------------------------|--------------------------------------------|-------------------------------|
| <i>Variables</i> | aOR<br>(95% CI)            | aOR<br>(95% CI)                           | aOR<br>(95% CI)                            | aOR<br>(95% CI)               |
|                  | (1)                        | (2)                                       | (3)                                        | (4)                           |
| 2015             | 1.106<br>(0.550 – 1.326)   | 0.691<br>(0.378 – 2.528)                  | 1.224<br>(0.381 – 1.483)                   | 1.451<br>(0.407 – 2.350)      |
| 2016             | 1.301<br>(0.631 – 1.939)   | 0.922<br>(0.223 – 2.146)                  | 1.330<br>(0.495 – 3.024)                   | 1.639<br>(0.581 – 3.627)      |
|                  | (0.706 – 2.398)            | (0.249 – 3.418)                           | (0.550 – 3.217)                            | (0.549 – 4.890)               |

Sources: CHIS 2013-2016

\* p<.05

\*\* p<.01

\*\*\* p<.001