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Disparities In Uptake Of HIV Pre-Exposure Prophylaxis Among California Medicaid Enrollees

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## **Disparities In Uptake Of HIV**

### **Pre-exposure Prophylaxis**

#### **Among California Medicaid**

#### **Recipients**

#### **ABSTRACT**

One of the pillars of the United States' efforts to curb HIV incidence is pre-exposure prophylaxis (PrEP). We examined racial and ethnic and sex disparities in PrEP uptake among California's Medicaid enrollees. Claims data from 2019 identified enrollees and PrEP users in each racial and ethnic, sex, and age group, yielding crude uptake rates. We then predicted age-adjusted uptake rates from multivariable logit regressions and divided PrEP uptake estimates by each group's number of new HIV diagnoses to estimate PrEP-to-need ratios. Predicted uptake was highest for White (0.29 percent) and Black (0.23 percent) males and lowest (0.16 percent) for Hispanic males. Rates for males exceeded those for females, but Black females had twice the rate of PrEP uptake of White females. Black males and females and Hispanic males had PrEP-to-need ratios that were less than one-third (4.0–6.3) those of Asian and White people (14.4–19.9). Low PrEP use rates and disparities in uptake threaten efforts to end the HIV epidemic. Policy makers must craft the rollout of innovations such as PrEP in a manner that narrows rather than widens HIV disparities.

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Pre-exposure prophylaxis (PrEP) provides a cost-effective means of preventing HIV transmission to uninfected persons at high risk of being exposed to the virus and is one of the pillars of the United States' Ending the HIV Epidemic in the U.S. initiative's efforts.<sup>1,2</sup> PrEP provides up to 99 percent protection from acquiring HIV infection among men who have sex with men who use it consistently.<sup>3</sup> Despite its demonstrated efficacy, uptake of this medication has been slow, even among those at high risk. AIDSvu estimated that the number of PrEP users increased at an annual rate of 55 percent between 2012 and 2019.<sup>4</sup> However, there were still only slightly more than 279,000 PrEP users in the US in 2020.<sup>5</sup> This number represents less than a quarter of what the Centers for Disease Control and Prevention (CDC) estimates as the number of persons having indications for PrEP.<sup>5</sup> There are significant disparities across states in the percentage of the population that is receiving PrEP.<sup>6</sup> For example, despite being the state with the largest number of PrEP users, California was tenth in terms of per capita PrEP uptake in 2019.<sup>6</sup>

Large disparities in PrEP use exist across racial and ethnic, sex, and age groups. Racial and ethnic minority groups account for almost three-quarters of new HIV diagnoses in the US,<sup>7</sup> yet the percentage of these groups that use PrEP trailed that of the non-Hispanic White group.<sup>8,9</sup> By age group, the highest rates of newly diagnosed US HIV cases among males occur among persons in their twenties, whereas the lowest occur among those ages fifty-five and older.<sup>7</sup> Although 19 percent of newly diagnosed HIV cases

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occur among females,<sup>7</sup> just 7.4 percent of PrEP users in 2019 were female.<sup>10</sup>

In contrast to males, HIV incidence rates in females are highest in and vary little across the 25–44 age range. Racial disparities in HIV incidence among females are marked, with Black females making up 55 percent of all females diagnosed with HIV in 2019, despite making up just 13 percent of the female population.<sup>7</sup> Across sexes, nearly two-thirds of PrEP users (64 percent) are ages 25–44<sup>10</sup> compared with the 55 percent of newly diagnosed HIV cases in 2019 who were in this age group.<sup>7</sup>

This article estimates disparities in PrEP uptake across racial and ethnic, sex, and age groups among people covered by Medi-Cal (California's Medicaid program). Low rates of uptake and disparities in uptake undermine one of the key pillars of the Ending the HIV Epidemic in the U.S. initiative: biomedical prevention. Different from most studies of disparities in PrEP uptake, we consider differences by sex and age, in addition to race and ethnicity. Furthermore, because our data source includes near-complete information on race and ethnicity, it does not have to rely on ecological data<sup>4</sup> or large-scale imputation of race and ethnicity to estimate uptake for these groups.<sup>11</sup> The focus of this article is on a defined population of California Medicaid (Medi-Cal) enrollees, all of whom have access to PrEP without prior authorization or cost-sharing.

Several hypotheses have been proposed to understand the sources of racial and ethnic disparities in PrEP uptake. One factor that may contribute to these disparities is the differing age distributions across these populations.

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For example, a larger proportion of younger persons among Hispanics may lead to an estimate of PrEP use that is low because youth in all racial and ethnic groups are less likely than adults to use PrEP.<sup>8</sup> This analysis adjusts for that composition effect by estimating age-adjusted rates of PrEP uptake by race and ethnicity.

Cost and health insurance coverage have been identified as barriers, suggesting that disparities in PrEP uptake across racial and ethnic groups relate to the greater rates of uninsurance and underinsurance in communities of color.<sup>12,13</sup> This study examines PrEP uptake among Californians with Medi-Cal coverage to determine whether the racial and ethnic disparities persist among publicly insured people. Medi-Cal beneficiaries are eligible for PrEP without prior authorization or cost-sharing.<sup>14</sup> The analysis of a Medi-Cal population also provides some protection against self-selection in the sample studied.

A third hypothesis proposes differential access attributable to social factors, including differing levels of familiarity with PrEP, provider-patient interactions, medical distrust, and stigma. Some studies have found that Black and Hispanic or Latino males have less knowledge about PrEP and are, therefore, less likely to use it.<sup>15-18</sup> Differential treatment and communication by medical providers, experiences of discrimination within health care settings, and differing levels of health literacy across racial and ethnic groups can engender a lack of trust in medical providers and pharmaceutical companies.<sup>19,20</sup> Along with homophobia, biphobia, and transphobia, stigma

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about PrEP and HIV can inhibit frank discussions about PrEP.<sup>21</sup> The levels and impacts of these stigmas may differ across groups and hinder diffusion of PrEP-related information through certain social networks. Low levels of PrEP use in these communities then further contribute to low knowledge levels in social networks.

The risk for HIV infection that is associated with specific sexual and drug-using behaviors also varies across racial and ethnic groups. For example, higher rates of HIV infection among Black men who have sex with men do not seem to relate to engaging in riskier sexual or drug-using behaviors, but relate instead to the higher underlying HIV prevalence among potential sexual partners in their social networks.<sup>22</sup> Nevertheless, reported risk behaviors signal both to providers and to patients themselves the potential need for PrEP, and provider guidance on PrEP prescribing emphasizes patient risk behaviors.<sup>23,24</sup> To account for different levels of behavioral risk, our analysis accounts for a specific, largely behavioral indicator of HIV risk that is derived from the Behavioral Risk Factor Surveillance System (BRFSS). We also estimate PrEP-to-need ratios to examine uptake relative to HIV incidence. Together, these approaches allow for a nuanced estimation of racial and ethnic, sex, and age disparities in PrEP uptake rates.

## **Study Data And Methods**

The primary outcome of interest was the uptake rate of PrEP among people of various racial and ethnic groups for both males and females

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covered by Medi-Cal. We measured uptake as the proportion of the eligible Medi-Cal population in each age, sex, and racial and ethnic group who have filled at least one prescription for PrEP in 2019. The eligible population was defined as persons on full-scope Medi-Cal who were ages 16–69 (inclusive), not known to be HIV-positive, and not dually enrolled in Medicare. The Pharmacy Benefits and Information Management Division of the California Department of Health Care Services used 2019 Medi-Cal claims files to calculate the numbers of unique people fitting these criteria who received at least one prescription for PrEP, which is defined as patients prescribed Truvada (emtricitabine-tenofovir) for greater than thirty days (either a prescription fill for more than thirty pills or a thirty-pill prescription but with refills) and not receiving any other antiretroviral therapy in 2019.

To protect confidentiality, the Department of Health Care Services was only able to provide aggregated data for this project. Data were provided as cross-tabulations by age group (16–34, 35–44, 45–54, and 55–69) and by racial and ethnic group (Hispanic or Latino, non-Hispanic White, Black or African American, and Asian, hereafter referred to as Hispanic, White, Black, and Asian, respectively). Sample sizes for other racial and ethnic groups were too small to support analyses and preserve data confidentiality. The Department of Health Care Services also provided data on the numbers of annual person years of enrollment for Medi-Cal eligibles in each age, sex, and racial and ethnic subgroup for whom claims data showed no evidence of living with HIV. We calculated the rate of PrEP uptake in each racial and

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ethnic, sex, and age group covered by the Medi-Cal program by dividing the number of PrEP beneficiaries by the total person-years for Medi-Cal enrollees in each subgroup. We used bivariate tests to examine where observed differences between groups were statistically significant.

### *Data*

To identify PrEP uptake by racial and ethnic group, net of differences in age distribution across racial and ethnic groups, we estimated multivariable logit regressions with PrEP uptake as the dependent variable separately for males and females. To determine whether different levels of exposure to risk underlie differences across racial and ethnic groups in PrEP uptake, we then added to the multivariable regressions a measure of risk of contracting HIV for each group derived from the BRFSS data. The BRFSS is a national population-based phone survey that asks respondents to indicate whether they have experienced any of the following five HIV risks in the past year<sup>25</sup>: any use of an injected drug other than those prescribed by licensed medical personnel, treatment for a sexually transmitted infection, given or received money or drugs in exchange for sex, had anal sex without a condom, or had four or more sex partners

These measures overlap with many of the CDC's recommended indicators for PrEP use. The 2017 practice guidelines included injection drug use, having been diagnosed with a sexually transmitted infection, and a history of condomless sex, with an emphasis on condomless anal sex between men.<sup>23</sup> We used data on BRFSS respondents who reported California



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as their state of residence and incomes that were at or below 138 percent of the federal poverty level to calculate the weighted percentage of Medi-Cal-eligible people who were Hispanic, Black, White, or Asian and at increased risk for HIV because of one or more of these five risk factors. The youngest BRFSS age category did not align completely with our Medi-Cal data, so we used the BRFSS measure for 18–24-year-olds to represent 16–24-year-olds.

### *Analysis*

We estimated logit regressions from the aggregated data using the number of those with a PrEP prescription as frequency weights to compare racial and ethnic, age, and risk groups within strata of males and females. This approach is appropriate for grouped data.<sup>26</sup> We then used the regression estimates to predict age-adjusted probabilities of PrEP uptake for each racial and ethnic group separately for males and females.

Finally, we estimated PrEP-to-need ratios by multiplying the age-adjusted probabilities of PrEP uptake by the number of enrollee years for each racial and ethnic group among males and females to estimate numbers of PrEP users. We then divided the estimated number of PrEP users by the estimated number of people newly diagnosed with HIV within each group using data reported in California's HIV Surveillance report.<sup>27</sup> We estimated the latter by applying the 2018 HIV diagnosis rates within each strata to our data on person-years of Medi-Cal enrollment for the corresponding strata. PrEP-to-need ratios have been used to assess whether PrEP use is consistent with epidemiologic need for specific geographic areas.<sup>28</sup>

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### *Limitations*

This study had several limitations. The fact that only grouped Medi-Cal data on PrEP uptake were made available to us limited our ability to examine individual-level factors that might be important within racial and ethnic, sex, and age groups or risks specific to the gender of sexual partners. These data also lump transgender and gender nonbinary people into female and male groups, not allowing estimation by gender identity. Nevertheless, given that one-quarter of California adults receive Medi-Cal,<sup>29</sup> claims data allowed us to examine PrEP uptake among a large subset of the general population—including females and heterosexual males—for whom PrEP has been less well studied. Because HIV diagnosis rates for Medi-Cal beneficiaries are not available, we applied HIV incidence rates for all people in California to our Medi-Cal data to estimate PrEP-to-need ratios. We note, however, that rates for beneficiaries may differ from those of the population as a whole. In addition, our definition of PrEP use did not include Descovy (emtricitabine-tenofovir alafenamid), resulting in potential underestimates. However, because Descovy became available in the final quarter of 2019 and only became part of the Medi-Cal formulary on December 1, 2019, we assume this impact to be minor. Furthermore, this omission did not affect our count of patients who were receiving PrEP with Truvada for some part of the fourth quarter of 2019. Finally, Medi-Cal claims data only document the dispensing of PrEP drugs and not whether the medications were actually taken. However, these

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claims data are likely to be reported with less error than self-reported data about PrEP use.

## **Study Results**

Exhibit 1 shows the uptake rate (that is, the number of unique PrEP users divided by enrollment years) for each age, sex, and racial and ethnic subgroup. The data used to calculate these rates are shown in online appendix exhibits A1 and A2.<sup>30</sup> Appendix exhibit A1 shows the numbers of unique Medi-Cal enrollees who filled a PrEP prescription at least once in 2019 for each age, sex, and racial and ethnic subgroup.<sup>30</sup> Enrollment years in Medi-Cal for those beneficiaries who are eligible for PrEP coverage for each subgroup are shown in appendix exhibit A2.<sup>30</sup>

As shown in Exhibit 1, uptake rates for females were significantly lower than those for males ( $t = -6.323$ ;  $p < 0.0001$ ; statistical tests not shown). In addition, within every racial and ethnic group, uptake rates were greater for males than females ( $p < 0.05$ ). White, Black, and Asian males showed generally higher uptake rates (for example, more than 0.4 percent for males ages 25–34) than Hispanic males (for example, 0.3 percent for males ages 25–34) (exhibit 1). In general, among both males and females in each racial and ethnic group, the youngest (16–24) and the oldest (55–69) age categories had the lowest PrEP uptake rates.

The multivariable regression results presented in exhibit 2 show how race and ethnicity and age relate to PrEP uptake among male and female Medi-Cal recipients. For each sex, results from a base model are shown first

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and the next column adds an estimated measure of HIV risk from BRFSS.

Relative to 16–24-year-old males, Medi-Cal recipients ages 25–34 were more than two times as likely to fill a PrEP prescription (odds ratio: 2.31; 95% confidence interval: 2.15–2.48). The oldest group also had higher rates of PrEP uptake than the youngest group, particularly after controlling for the BRFSS HIV risk indicator (OR: 1.18; 95% CI: 1.09–1.28). In terms of race and ethnicity, Hispanic (OR: 0.54; 95% CI: 0.51–0.58), Black (OR: 0.79; 95% CI: 0.72–0.86), and Asian males (OR: 0.62; 95% CI: 0.56–0.69) were significantly less likely to take up PrEP than White males. These associations remained after controlling for BRFSS HIV risk.

Exhibit 2 also shows the regression results for females. A comparison of columns 1 and 3 shows similar age patterns for PrEP prescriptions for males and females, with the highest rates in the 25–34 age group (OR: 1.86; 95% CI: 1.53–2.28) and higher rates for older females (ages 35–69) (OR: 1.39; 95% CI: 1.15–1.69) than for younger females (ages 16–24). This pattern was also observed among male Medi-Cal recipients. Hispanic (OR: 0.50; 95% CI: 0.43–0.59) and Asian (OR: 0.66; 95% CI: 0.51–0.85) females were half to two-thirds as likely to be prescribed PrEP as White females. In contrast to what was observed for males, Black females were two times as likely to uptake PrEP as White females (OR: 1.93; 95% CI: 1.60–2.33). This odds ratio increased by about 50 percent after inclusion of the BRFSS HIV risk measure (OR: 2.87; 95% CI: 2.16–3.80), indicating that Black females' higher PrEP uptake is not explained by increased HIV risk in this group. Nevertheless, the

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BRFSS ORs of 3.80 and 6.13 for males and females, respectively, do indicate that behavioral risk is positively associated with PrEP uptake for both groups.

Columns 1 and 2 of exhibit 3 present age-adjusted PrEP uptake rates for males and females by race and ethnicity, based on the logit regressions. White males have the highest predicted rate, at 0.29 percent, which is about 26 percent higher than the percentage of Black males who were prescribed PrEP (0.23 percent, not adjusted for risk). Asian males trail behind Black males (0.18 percent). Hispanic males filled PrEP prescriptions nearly half the rate of White males (0.16 percent). As expected, rates for males substantially exceed those for females—however, Black females (0.06 percent) have twice the rate of PrEP uptake as White females (0.03 percent).

For comparison, the prevalence of BRFSS-defined HIV behavioral risks for males and females in each racial and ethnic group are shown in columns 3 and 4 of exhibit 3, and the rates of new HIV diagnoses in California in 2018 by race and ethnicity are shown in columns 5 and 6. Rates of new diagnoses for females were lower than for males. HIV incidence among Black males is nearly four times that of White males, yet their uptake of PrEP is close to that of White males. Black male Medi-Cal beneficiaries also report higher levels of BRFSS HIV risk behaviors than do other male beneficiaries. Because of their lower HIV diagnosis rates and higher levels of PrEP uptake, PrEP-to-need ratios for White males (19.9) dwarf those of Black or Hispanic males (4.0 and 6.3, respectively), as seen in columns 7 and 8. Asian males have PrEP-to-need ratios (14.4) similar to those of White males. Smaller, but still

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substantial, disparities are observed when comparing White and Black and Hispanic females. Within races and ethnicities, PrEP-to-need ratios differed little by sex.

## **Discussion**

We initially posited several hypotheses about the sources of disparities in PrEP uptake rates by demographic group. We can reject the hypothesis that the differentials arise because of a lack of health insurance, as all people in the sample had access to free medical care and PrEP, without prior authorization, through Medi-Cal. Although lack of health insurance is no doubt a factor contributing to disparities in health outcomes and use, the continued presence of disparities in this sample of Medi-Cal recipients who all had access to PrEP at no cost points to the need to look beyond insurance to other factors that limit uptake of PrEP across demographic groups.

We can also reject the hypothesis that the differences in uptake arise from differences in age distribution across racial and ethnic groups because our age-adjusted estimates continue to show disparities between White men and men of color. Conversely, Black women are substantially more likely than women of other races or ethnicities to be prescribed PrEP despite reporting a lower frequency of BRFSS HIV risk factors. This finding may reflect the perception of these women and their providers that HIV prevalence is higher in Black and African American communities, together with broadly focused efforts to increase PrEP use among Black women. Although a higher percentage of males than females took up PrEP, as did a

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higher percentage of White males than males of other races or ethnicities, none of the uptake rates reached even 1 percent despite their BRFSS HIV risk estimates ranging between 11.3 percent and 16.2 percent.

Estimated PrEP-to-need ratios, which involve data on HIV incidence, indicate that among both males and females, Black and Hispanic people have far lower PrEP uptake rates relative to their risk than do White males, a disparity that is starkest among Black males. The AIDS Vu collaborative estimates that PrEP-to-need ratios for the US range between 4.3 for people ages 13–24 and 7.4 for those ages 35–44; they estimate the female PrEP-to-need ratio to be 2.3 and the male PrEP-to-need ratio to be 6.9.<sup>10</sup> The ratios comparing PrEP-to-need ratio estimates for Black male and female and Hispanic male beneficiaries to White beneficiaries would be much smaller than the corresponding fully adjusted odds ratio comparisons in exhibit 2. This further indicates that recommended PrEP indicators do not account for population differences in HIV incidence and that solely relying on them for determining who is offered PrEP may contribute to disparate uptake.

Although youth and young adults account for an increasing share of new HIV diagnoses, they do not account for a correspondingly high share of PrEP users. PrEP stigma, low risk perceptions, and more chaotic lifestyles may contribute to lower rates of uptake among this group. The recent development of long-acting injectable PrEP<sup>31,32</sup> may help to increase uptake by offering PrEP more discreetly, in a clinical setting at bimonthly intervals, and not requiring daily adherence.

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## **Conclusion**

These low rates of PrEP uptake relative to need suggest an opportunity to increase HIV prevention for those at highest risk and to reduce disparities in incidence. However, if efforts to expand PrEP use are implemented without attention to these disparities, they may widen disparities in uptake by sex and race and ethnicity. Therefore, it is imperative that policy makers continue to monitor the rollout of new technology, such as long-acting injectables, to ensure that new developments do not widen disparities.

Adult Medicaid patients tend to be served by a limited number of primary care providers and community health clinics, facilitating intervention. Providing focused outreach, education, and technical support to Medicaid agencies and Medicaid managed care organizations has been recommended to increase PrEP use and has the potential to ameliorate disparities in PrEP uptake,<sup>33</sup> particularly in states with Medicaid expansion.<sup>34</sup> However, because eight of the twelve states that have not expanded Medicaid are in the Southern US—a region that accounts for 52 percent of new HIV diagnoses, with a majority occurring among Black people—even this approach has the potential to exacerbate disparities at the national level.<sup>10,35</sup>

California Senate Bill 159, which became law in January 2020, allows pharmacists to dispense PrEP and adds PrEP to the pharmacy benefits covered by Medi-Cal.<sup>14</sup> The pharmacy option may reduce access barriers for Medi-Cal beneficiaries who lack a primary care provider or are uncomfortable initiating a PrEP conversation with their provider. Although the legislation



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offers new options both for direct marketing and for consumers to initiate PrEP, pharmacists can, at most, furnish a sixty-day supply of the preventive medication.<sup>36</sup> It remains to be seen what proportion of Californians who initiate PrEP in this manner will eventually obtain a prescription from a provider to allow them to continue it. The type of Medi-Cal data used here may provide a useful tool for tracking implementation and examining future disparities in uptake of PrEP.

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## **Exhibit List**

**Exhibit 1 (Table)**

**Exhibit 2 (Table)**

**Exhibit 3 (Table)**

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## EXHIBITS

### Exhibit 1: Pre-exposure prophylaxis (PrEP) uptake rates by demographic group among Medi-Cal recipients, 2019

Ages (years)	PrEP uptake rates (in 100 person years of enrollment)								
	White		Hispanic		Black		Asian		Overall
	Females	Males	Females	Males	Females	Males	Females	Males	
16-24	0.023	0.159	0.011	0.147	0.046	0.166	0.017	0.135	0.079
25-34	0.045	0.455	0.023	0.316	0.066	0.404	0.036	0.419	0.173
35-44	0.049	0.381	0.021	0.144	0.084	0.276	0.042	0.265	0.114
45-54	0.028	0.310	0.017	0.082	0.081	0.170	0.014	0.120	0.082
55-69	0.014	0.200	0.006	0.040	0.045	0.148	0.007	0.019	0.051
Over all	0.033	0.310	0.016	0.161	0.064	0.246	0.021	0.182	0.106

SOURCE Authors calculations from tabulations of 2019 Medi-Cal claims provided by the California Department of Health Care Services, Pharmacy Benefits and Information Management divisions. NOTE The full version of this exhibit, with the date used to calculate these rates appears in online appendix exhibits A1 and A2 (see note 30 in text).



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**Exhibit 2: Odds ratios of pre-exposure prophylaxis (PrEP) uptake by Medi-Cal recipients, 2019**

Variables	Males		Females	
	Base model	Risk-adjusted model	Base model	Risk-adjusted model
Age category, years (ref = 16-24) <sup>a</sup>				
25-34	2.31****	2.67****	1.86****	2.11****
35-69	1.02	1.18****	1.39***	1.71****
Race and ethnicity (ref = White, non-Hispanic) <sup>a</sup>				
Hispanic	0.54****	0.56****	0.50****	0.66****
Black, non-Hispanic	0.79****	0.72****	1.93****	2.87****
Asian, non-Hispanic	0.62****	0.63****	0.66***	0.72**
BRFSS HIV risk (among adults in California with incomes at or below 138% FPL)	— <sup>b</sup>	3.80****	— <sup>b</sup>	6.13****
Constant	0.002	0.002	0.002	0.002

SOURCE Authors' calculations from data in online appendix exhibit A1 (see note 30 in text). NOTES Columns 1 and 3 show a base model for males and females. Columns 2 and 4 include a measure of risk from Behavioral Risk Factor Surveillance System (BRFSS) in the male and female models; see Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, 2018 BRFSS survey data and documentation (see note 25 in text). FPL is federal poverty level. <sup>a</sup>Reference value is 1. <sup>b</sup>This variable was not included in the base model. \*\* $p < 0.05$  \*\*\* $p < 0.01$  \*\*\*\* $p < 0.001$

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**Exhibit 3: Age-adjusted pre-exposure prophylaxis (PrEP) uptake, HIV risk estimates, and PrEP-to-need ratio estimates by race and ethnicity and sex**

Race and ethnicity	Predicted rate of PrEP uptake (%)		BRFSS HIV risk (%) <sup>a</sup>		HIV incidence rate (per 100,000) <sup>b</sup>		PrEP-to-need ratio	
	Males (1)	Females (2)	Males (3)	Females (4)	Males (5)	Females (6)	Males (7)	Females (8)
Black	0.23	0.06	16.2	0.8	57.1	11.9	4.0	5.0
Hispanic	0.16	0.02	11.3	5.5	25.3	2.5	6.3	8.0
White	0.29	0.03	12.2	11.5	14.6	1.8	19.9	16.7
Asian	0.18	0.02	11.7	17.1	12.5	1.1	14.4	18.2

SOURCES Columns 1 and 2: Authors’ calculations based on information from exhibit 2. Columns 3 and 4, see Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, 2018 BRFSS Survey Data and Documentation (see note 25 in text). Columns 5 and 6, rates of newly diagnosed HIV are from California Department of Public Health, Center for Infectious Diseases, Office of AIDS, Supplemental tables to the California HIV surveillance report—2018 (see note 27 in text). Columns 7 and 8, data are from authors’ calculations based on PrEP uptake information from exhibits 2 and A2 and HIV incidence rates from columns 5 and 6 (see online appendix, see note 30 in text). <sup>a</sup>Among adults in California with incomes at or below 138 percent of the federal poverty level. <sup>b</sup>Among adults in California with Medi-Cal.

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