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PrEP, Prevention, and Place: Examining the Effect of Geographic Accessibility on the Use of HIV Pre-Exposure Prophylaxis

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An abstract of
A dissertation submitted to the Faculty of the
James T. Laney School of Graduate Studies of Emory University
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Abstract

PrEP, Prevention, and Place: Examining the Effect of Geographic Accessibility on the Use of HIV Pre-Exposure Prophylaxis

By J. Danielle Sharpe

Pre-exposure prophylaxis (PrEP) is an antiretroviral medication that is effective for preventing HIV transmission in HIV-negative persons; however, PrEP uptake is low in the U.S. Suboptimal geographic proximity to PrEP services is recognized as a contributor to such low uptake. This dissertation examined the geographic accessibility of PrEP-providing clinics in the U.S. over time and investigated the associations between area-level geographic accessibility of PrEP and individual-level use of PrEP across urbanicity levels. First, we examined the spatiotemporal distribution of PrEP accessibility from 2016-2020 and characterized factors contributing to this distribution. We found a decrease in PrEP deserts by 52.8% and an increase in PrEP oases by 33.5% between 2016-2020. Of 72,339 census tracts, 12,487 (17.3%) were persistent PrEP deserts, 753 (1.0%) were new PrEP deserts, 15,568 (21.5%) were new PrEP oases, and 43,506 (60.1%) were persistent PrEP oases between 2016-2020. Persistent PrEP oases were more likely to be of higher socioeconomic status, racially/ethnically diverse, located in urban areas, and located in the Northeast compared to other spatiotemporal PrEP accessibility types. Next, we investigated the association between geographic accessibility of PrEP-providing clinics and PrEP use among men who have sex with men (MSM) residing in nonurban areas in the U.S. We found that suburban MSM residing in PrEP deserts were less likely to use PrEP in the past year than suburban MSM not residing in PrEP deserts. Other nonurban MSM residing in PrEP deserts were also less likely to use PrEP in the past year than other nonurban MSM not residing in PrEP deserts but at a smaller magnitude than suburban MSM. Lastly, we investigated the association between transportation modes used to access healthcare services and persistent PrEP use among MSM in urban areas. We found that urban MSM using public transportation had lower odds of PrEP persistence than urban MSM using private transportation. We found no significant associations between PrEP persistence and using multiple transportation modes or active transportation modes. The findings of this dissertation will inform the spatial allocation of PrEP-providing clinics and tailored transportation-related interventions to improve PrEP use among MSM populations in the U.S. across urbanicity levels.

PrEP, Prevention, and Place: Examining the Effect of Geographic Accessibility on the Uptake of HIV Pre-Exposure Prophylaxis Services

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Chapter 1. Background and Significance

The Epidemiology of HIV in the United States

Disease caused by the human immunodeficiency virus (HIV), a sexually transmitted infection (STI), is one of the major public health issues in the United States (U.S.).[1] There are approximately 1.1 million persons with HIV (PWH) residing in the U.S.,[2] another 1.1 million persons at high risk for HIV infection,[3,4] and billions of dollars allocated towards HIV prevention and care in the U.S. annually.[5-8] HIV disproportionately affects different populations in the U.S., such as persons who identify as male, are under the age of 45 years, and are of Black race or Hispanic/Latino ethnicity (see **Figure 1**).[2,9,10] Similarly, there are disparities along the steps of the HIV care continuum[11-13] that are evident by sex, race and ethnicity, and age. For instance, men are less likely to be aware of their HIV status, linked to HIV care, retained in care, and on ART compared to women.[9,14,15] Black and Hispanic/Latino persons are less likely to be aware of their HIV status, linked to and retained in care, on ART, and virally suppressed compared to Whites.[9,14-20] Based on age, younger persons are less likely to have achieved steps along the HIV care continuum in comparison to older persons.[9,14-16,19]

In addition, HIV health disparities in the U.S. exist by risk group, particularly among gay, bisexual, and other men who have sex with men (MSM).[2,9,10] The HIV epidemic has been associated with MSM since it was initially recognized in the U.S.,[21] and this sexual minority group continues to endure the greatest burden of the HIV epidemic in the U.S.[22] Between 2005-2014, while a 19% decrease in annual HIV diagnoses was reported for the entire U.S., a 6% increase was reported among MSM populations.[22] In fact, although MSM constitute only 2% of the U.S. population, this group represented nearly two-thirds of all U.S. HIV diagnoses in 2014, primarily being driven by young Black and Hispanic/Latino MSM.[22] Previous work has also described such increases in HIV diagnoses among MSM, regardless of declines in new HIV infections observed at the national level.[23] More recently, HIV transmission due to male-to-male sexual contact represented approximately 67% of all 38,281 HIV diagnoses reported in 2017, much like in 2014.[24] Furthermore, HIV prevalence is also high among MSM,

with this population consistently comprising of 53-57% of all persons with diagnosed and undiagnosed HIV infection in the U.S. between 2010-2016.[2]

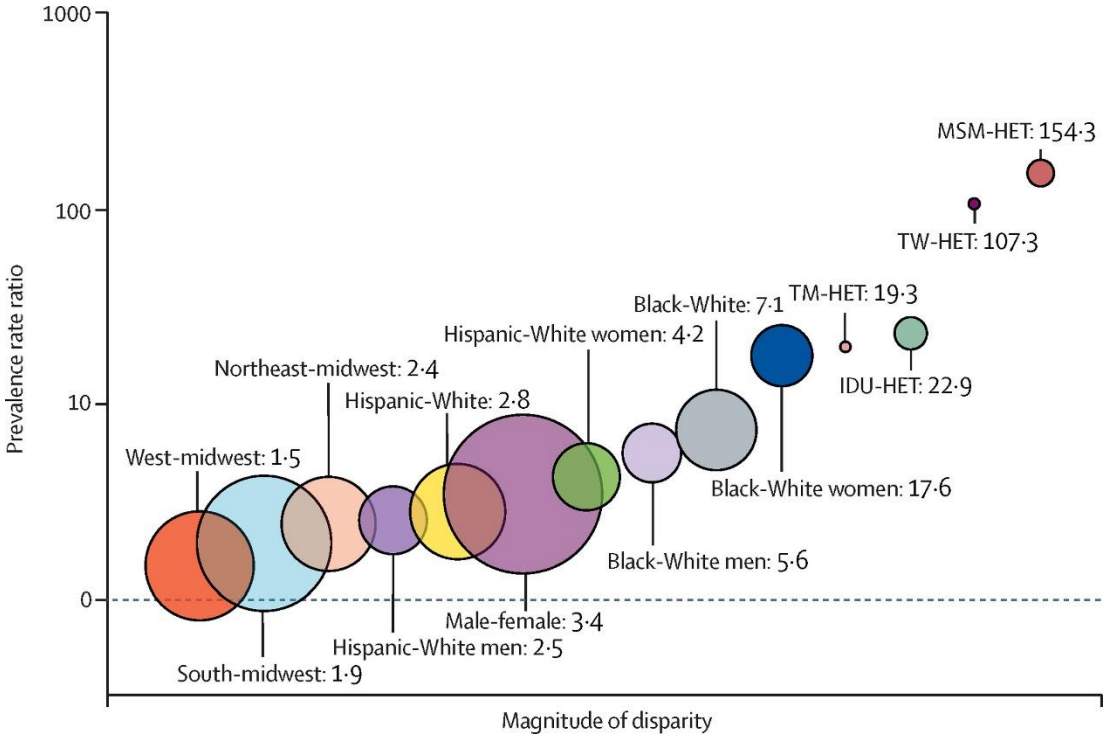

Figure 1. Disparities in HIV prevalence in the U.S. by race/ethnicity, sex, race/sex subgroup, risk group, and region, 2017. From Sullivan et al., Lancet, 2021.[10]

Also, HIV health disparities are evident throughout the U.S. when examining the spatial epidemiology of HIV. Essentially, PWH in the South have poorer outcomes than PWH residing elsewhere in the U.S. In particular, the lifetime risk of HIV diagnosis is higher among persons who reside in the South (see **Figure 2**).[2,25,26] For outcomes along the HIV care continuum, PWH living in southern states have poor outcomes in regards to HIV diagnosis, linkage to HIV care, and retention in care.[15,27,28] Also, PWH in the South have worse viral suppression outcomes than PWH in other regions of the U.S.[15,27,29] More recently, there were 19,968 HIV diagnoses reported in the South, which was 52% of all HIV diagnoses reported in the U.S. in 2017.[24] While HIV prevention and treatment have considerably

improved over the past three decades,[30] gains in stemming the HIV epidemic in the U.S. have stalled in recent years,[2,15] particularly among MSM and populations residing in southern states.

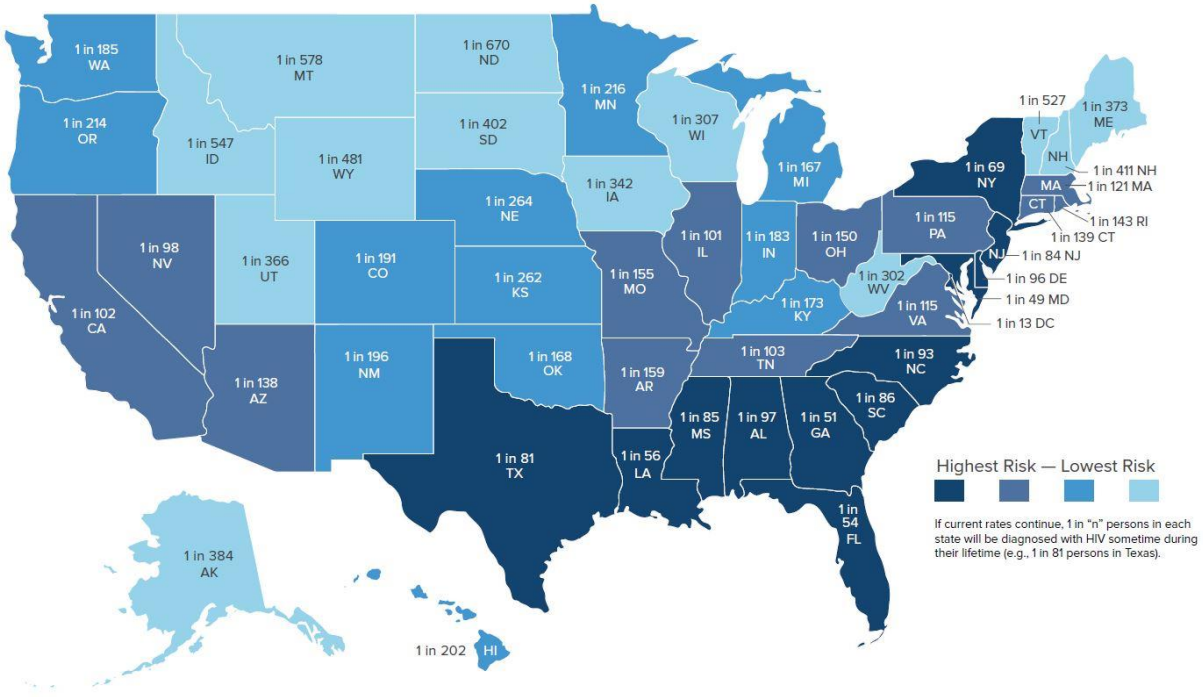

Figure 2. Lifetime risk of HIV diagnosis by state. From the U.S. Centers for Disease Control and Prevention, 2016.[26]

The United States "Ending the HIV Epidemic" Initiative

With progress against the HIV epidemic having stabilized,[2,15] national campaigns have been developed to expand HIV prevention and treatment efforts in the most HIV-burdened areas of the U.S. In February 2019, the U.S. Department of Health and Human Services (HHS) established the "Ending the HIV Epidemic" (EHE) Initiative to impede the current HIV epidemic within a 10-year period, with an emphasis on reducing new cases of HIV infection throughout the U.S.[1,8] The goals of the EHE Initiative are particularly to decrease HIV incidence by 75% in a 5-year period and by 90% in 10 years.[1,8,31] After the announcement of the EHE plan, supplemental funding of $291 million was proposed to facilitate implementing the EHE Initiative, which was in addition to the approximately $20 billion budget to fund

domestic HIV prevention and care services.[8] Directed by HHS, the EHE Initiative is an interagency effort involving several institutes, centers, and offices, such as CDC, the National Institutes of Health, and the Health Resources and Services Administration (HRSA).[1,8]

Leadership of the EHE Initiative has established four strategies through which scientific, medical, public health, and health policy practitioners and decision makers may facilitate and support ending the HIV epidemic in the U.S. The first strategy is to increase HIV testing and diagnose all persons with HIV infection with timeliness, and the second strategy is to treat all persons with HIV infection in order to achieve viral suppression.[1,8] Third, as another strategy, the EHE Initiative identifies the importance of preventing HIV-negative persons from becoming infected with HIV through the use of preventive tools, such as HIV pre-exposure prophylaxis (PrEP) and syringe exchange programs.[1,8] Lastly, the fourth strategy of the EHE Initiative is to quickly detect and respond to potential emerging outbreaks of HIV transmission.[1,8] Led by HHS, federal public health agencies partner with state and local public health agencies, practitioners, clinicians, and community-based organizations to implement these EHE strategies, targeting HIV care, prevention, and testing interventions in areas most affected by HIV in the U.S.

Moreover, the EHE Initiative particularly aims to address the disproportionate incidence and prevalence of HIV in geographic hot spots of the U.S. (see **Figure 3**).[1,8] In the first phase of the EHE Initiative, efforts are focused in 48 counties across 19 states, Washington, D.C., and San Juan, Puerto Rico as well as in rural areas in Alabama, Arkansas, Kentucky, Mississippi, Missouri, Oklahoma, and South Carolina.[1,8] Of the 57 priority areas for the EHE Initiative, over half are located in southern states. Due to the South only encompassing 38% of the U.S. population but nearly half of all PWH, incident HIV infections, and undiagnosed HIV infections, federal institutions, such as CDC and HRSA, have implemented interventions beyond the scope of the EHE Initiative to address HIV disparities in disproportionately affected areas in the South.[31,32] Such federal initiatives emphasize increasing HIV prevention efforts as crucial pathways to disrupt the HIV epidemic in the U.S., for which improving access to and use of PrEP has been established as a primary objective.[1,8,31-33]

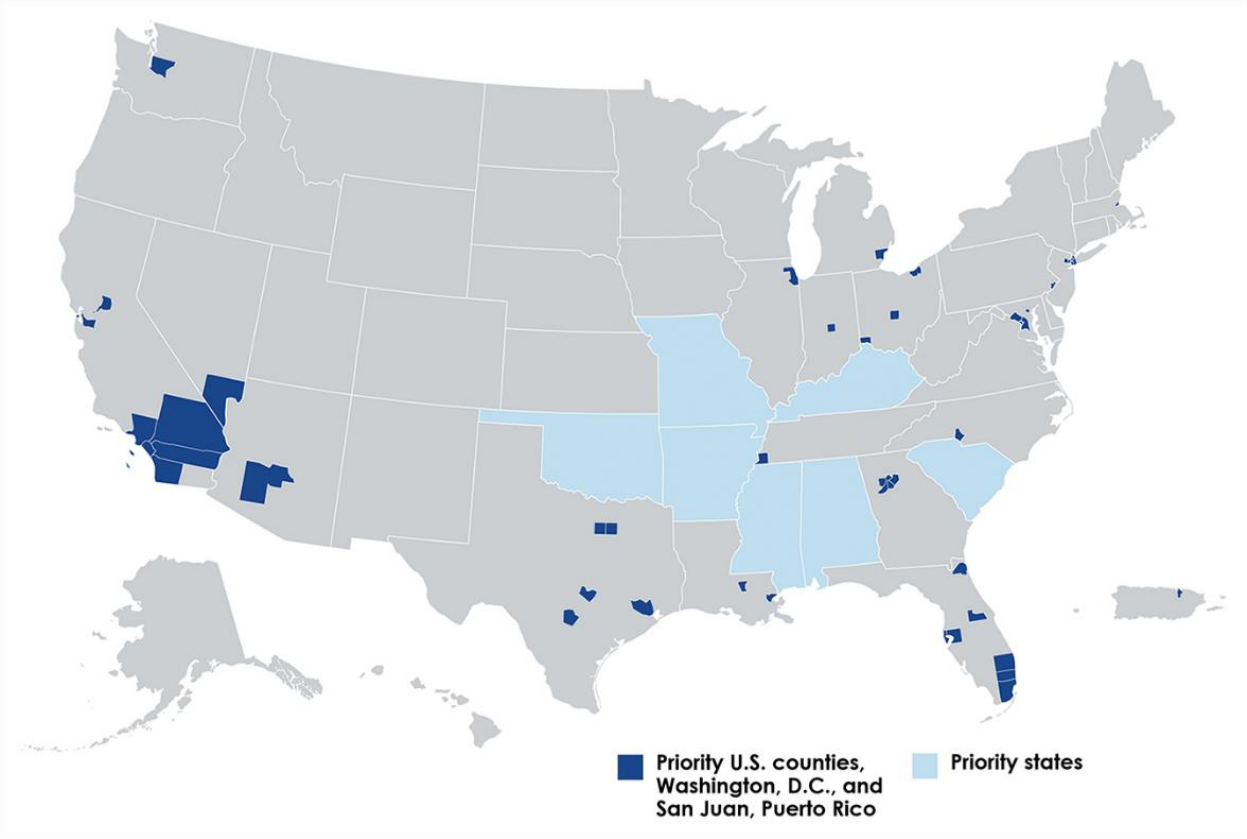

Figure 3. Geographic priorities of the United States "Ending the HIV Epidemic" Initiative. From the U.S. Centers for Disease Control and Prevention, 2019.

HIV Pre-exposure Prophylaxis (PrEP)

PrEP is an antiretroviral medication that is highly effective for preventing HIV transmission in HIV-negative persons.[34-43] In July 2012, PrEP was approved by the U.S. Food and Drug Administration (FDA) as daily, oral use of tenofovir disoproxil fumarate and emtricitabine (TDF-FTC) for HIV-negative individuals who were at high risk for HIV infection.[44] Following the approval of PrEP for use in the U.S., CDC published guidelines for prescribing PrEP to MSM,[45] heterosexual men and women,[46] and persons who inject drugs.[47] CDC has since updated clinical practice guidelines for all populations at high risk for HIV infection and seeking PrEP, which reference indicators of risky sexual behaviors such as unprotected sex, multiple sexual partners, sex with a partner with HIV, or recent bacterial STIs.[48] In October 2019,

FDA approved a second drug, tenofovir alafenamide with emtricitabine (TAF–FTC), for use as PrEP.[49,50] Not only has PrEP been determined to be effective at reducing risk for HIV by up to 99% at the individual level,[40,42,43] this biomedical intervention is associated with fewer HIV diagnoses at the state level as well.[51]

PrEP is an effective method for preventing HIV infection; however, the use of PrEP is very low in the U.S. Although 1,144,550 persons have indications for PrEP,[3,4] meaning they are at high risk for HIV infection, several studies have estimated PrEP use at quantities much lower than those in need of PrEP. Recent studies have found there are only an estimated 70,395-235,683 persons who are PrEP users in the U.S.[52-54] Similarly, low PrEP uptake is found among MSM populations as well, which is especially problematic since MSM represent the population most disproportionately affected by HIV in the U.S.[2,4,55-58] PrEP usage among MSM has been reported at uptake levels as low as 4%-9%.[59-61] Recent research has shown that such PrEP uptake levels have increased to 35% among MSM.[62] Nonetheless, a disparity in the use of this HIV prevention modality among MSM remains, as MSM represent 71% of the estimated 1.1 million persons who need or are eligible for PrEP.[4] More recently, access to PrEP has been identified as one of the key factors that influences PrEP use in the HIV prevention cascade (see **Figure 4**),[63] and HIV epidemiologists have posited that suboptimal spatial proximity to PrEP-providing clinics is a contributor to low PrEP access and use among disproportionately affected populations, such as MSM.[64,65]

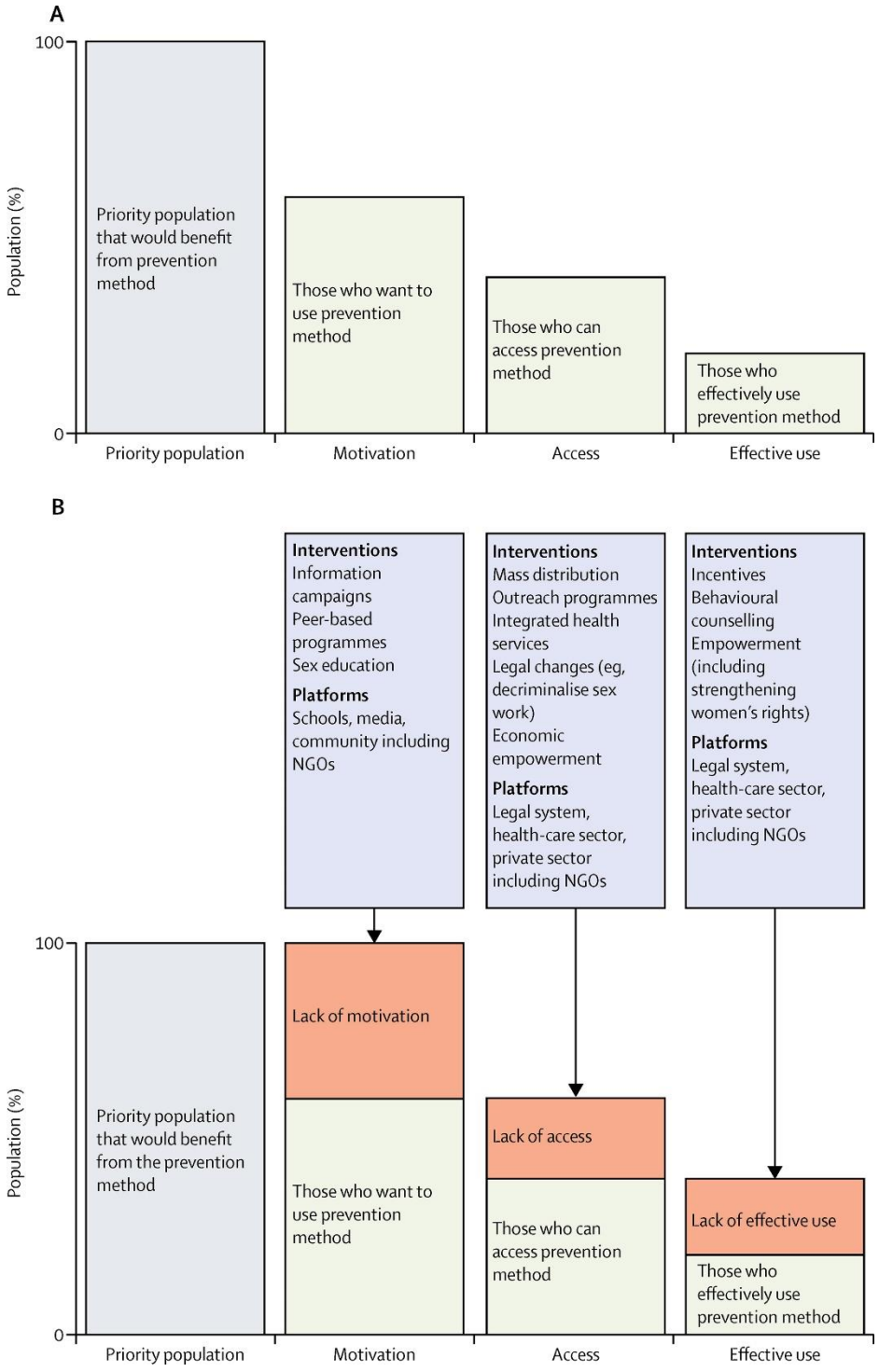

Figure 4. HIV prevention cascade framework. From Schaefer et al., Lancet HIV, 2019.[63]

While there is evidence on the extent to which the geographic accessibility of HIV-related services may be suboptimal throughout the U.S.,[66-70] very few studies have examined the geographic

accessibility of PrEP services in the U.S. The PrEP Locator database was developed as an online, national database to aid persons interested in using PrEP with locating approximately 4,000 registered clinics and healthcare providers who prescribe PrEP in the U.S.[71,72] Research using data from PrEP Locator found that, in 2017, nearly 109,000 or one in eight PrEP-eligible MSM in the U.S. resided in a PrEP desert, defined as more than 30 minutes from the nearest PrEP-providing clinic (see **Figure 5**).[73] When examining PrEP-providing clinics with specialized services, roughly 143,000 and 154,000 PrEP-eligible MSM also resided in PrEP deserts of PrEP-providing clinics offering financial navigation assistance and PrEP-providing clinics serving medically uninsured populations, respectively.[73] Moreover, significantly lower access to PrEP services has been reported in rural and suburban areas as well as in areas in the southern U.S., further emphasizing the importance of space, place, and geography for accessing PrEP services.[52,54,73,74]

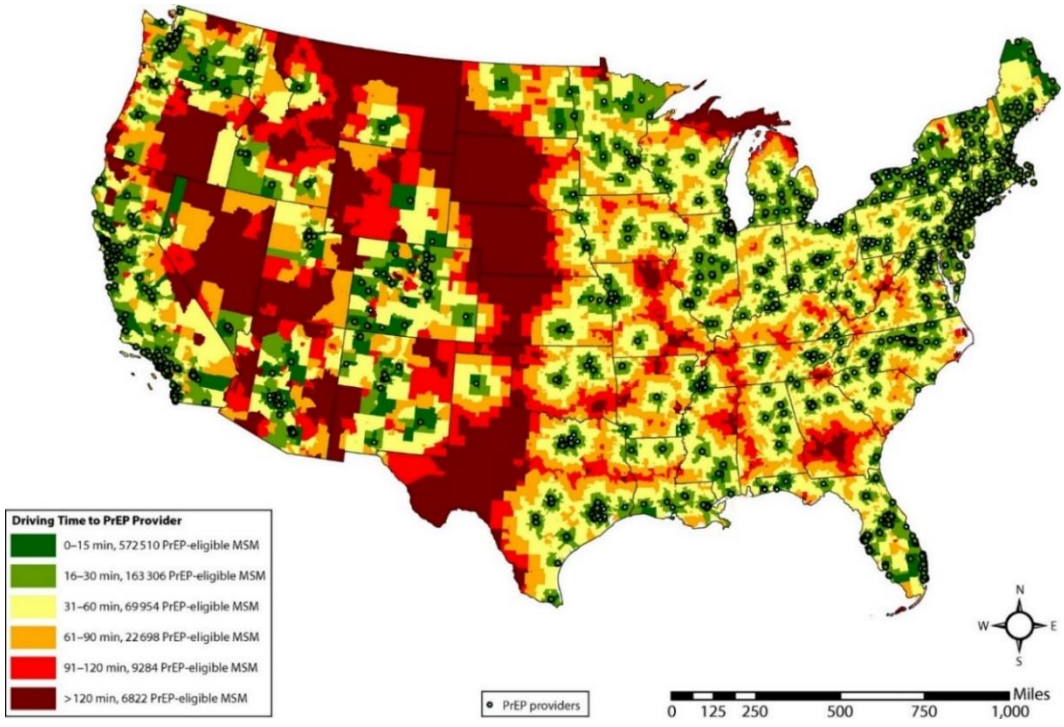

Figure 5. Drive-time accessibility of PrEP-providing clinics in the contiguous U.S. From Siegler, Bratcher, and Weiss, American Journal of Public Health, 2019.[73]

Conceptual and Theoretical Frameworks

This dissertation was conducted primarily at the convergence of three multilevel conceptual models. The first conceptual model is Buot and colleagues' model of social determinants of HIV health, which introduces a framework positing the connections between distal population-level determinants and proximal individual-level health behaviors that influence a person's HIV risk.[75] The second conceptual model is Penchansky and Thomas's framework of healthcare access, which details fives dimensions of access contributing to a person's ability to access health care.[76] The final conceptual model used to guide this dissertation is Andersen's behavioral model of health services use, which suggests there are both structural-level and individual-level determinants that influence a person's use of healthcare services.[77] Collectively, various constructs of these three conceptual models were used to investigate the structural landscape of PrEP-providing clinics over geography and time and to examine how the geographic accessibility of PrEP services affects PrEP use in disproportionately affected persons, namely MSM.

Buot and colleagues' conceptual model of sociological determinants of HIV disparities presents a multilevel continuum of determinants of health that affect a person's risk for HIV infection (see **Figure 6**).[75] Their model strives to explain the complex relationships and mechanisms between HIV risk and a multitude of socioecological factors, which include distal population-level social and structural factors, proximal individual-level factors, and the meso-level factors connecting the distal and proximal spectrums of the continuum.[75] This conceptual model hypothesizes how social environments and structural determinants of health are crucial in influencing a person's risk for HIV infection across sex, race/ethnicity, and risk group. For instance, Buot and colleagues posit that HIV risk can be both directly and indirectly affected by distal determinants of health, such as social disadvantage and other inequities in the social structure (e.g., inequitable access to healthcare infrastructure).[75] Moreover, such determinants are inherently spatial and underscore the role of space and place in how key institutions are structured within society to contribute prevent HIV infection or, conversely, contribute to increased HIV risk.

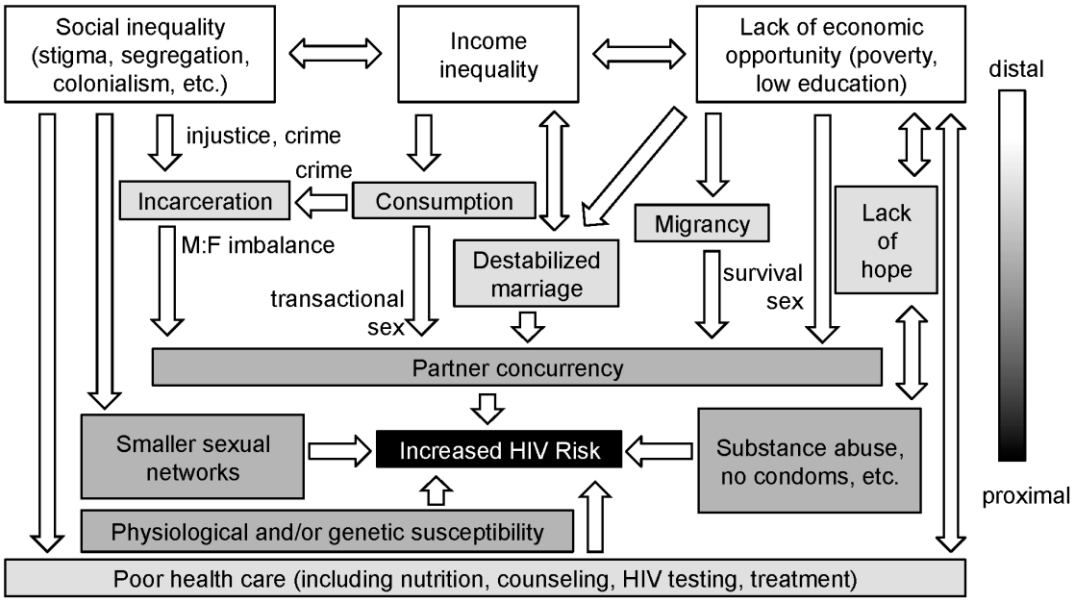

Figure 6. Conceptual model of distal and proximal sociological determinants of HIV disparities. From Buot et al., PLoS One, 2014.[75]

Penchansky and Thomas's five-dimension conceptual model of healthcare access provides a basis for exploring the spatial and structural barriers experienced by MSM with respect to seeking and accessing PrEP services. Their framework includes the following dimensions: availability, affordability, acceptability, accommodation, and accessibility (see **Figure 7**).[76,78,79] Availability is defined as the density of healthcare services of interest in relation to a patient population in a specified service area.[76,78,79] Affordability refers to the correspondence between the cost of healthcare services and the extent to which a patient population can satisfy such costs.[76,78,79] Acceptability emphasizes the suitability of patient-provider relationships to both involved parties.[76,78,79] Accommodation refers to the capacity of healthcare facilities to adequately serve a patient population and the capacity of a patient population to become integrated within the operational constraints of healthcare facilities.[76,78,79] Lastly, accessibility addresses the geospatial attributes of healthcare facilities, such as travel distance, travel time, mode of transportation, and other travel costs, with respect to a patient population.[76,78,79]

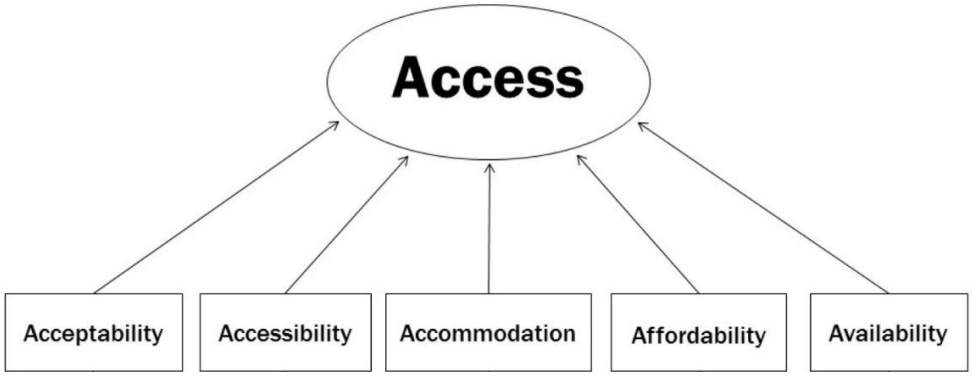

Figure 7. The five dimensions of access to care. Modified from Usher, Journal of Agriculture, Food Systems, and Community Development, 2015.[80]

Penchansky and Thomas's concept of accessibility, the dimension that is inherently geographic and spatial, is the focus of this dissertation. Accessibility especially facilitates the utilization of HIV prevention and care services, as space and place matter greatly for persons at high risk for HIV as well as for persons with HIV infection.[81-85] The accessibility of HIV care, prevention, and ancillary services is affected by travel distance,[86-91] travel time,[66-68,70,73,91,92] and modes of transportation.[68,70,81,82] However, research has not been conducted to quantify the relationship between the geographic accessibility of PrEP-providing clinics and the use of PrEP services, including not for MSM who represent a population disproportionately affected by HIV. Penchansky and Thomas's concept of accessibility and extensions of their concept provide the foundation for exploring issues of how the geographic distribution of PrEP services influences PrEP accessibility and, thusly, the use of PrEP in key populations.

Lastly, Andersen's behavioral model of health services use provides a multilevel framework positing that the utilization of healthcare services is facilitated and hindered by contextual-level and individual-level determinants (see **Figure 8**).[77] Andersen categorizes these determinants as predisposing factors (e.g., sociodemographics, social structure, etc.), enabling resources (e.g., health insurance coverage, income, availability of healthcare services, etc.), and need factors (e.g., risk, health status, etc.).[77] Andersen's model refers to contextual factors as aspects of the social, economic, institutional, built, and political environments that affect a person's ability to access health care.[77] Based on this

conceptual model, contextual factors predispose people to use or not use available services, such as living in a neighborhood with a demographic composition that influences the availability, type, and quality of healthcare services in such a neighborhood. Contextual factors can also be enabling factors that may serve as facilitators or barriers to the utilization of services, such as residing in a neighborhood that does not have an optimal density of healthcare facilities in relation to a population in need. Contextual factors can also highlight need, such as the concentration of HIV prevalence in a neighborhood. Similar to the frameworks developed by Buot et al. and Penchansky and Thomas, Andersen's multilevel model is also inherently spatial, emphasizing the propensity of structural, social, and geographic determinants to affect health behavior and healthcare services use both directly and indirectly.

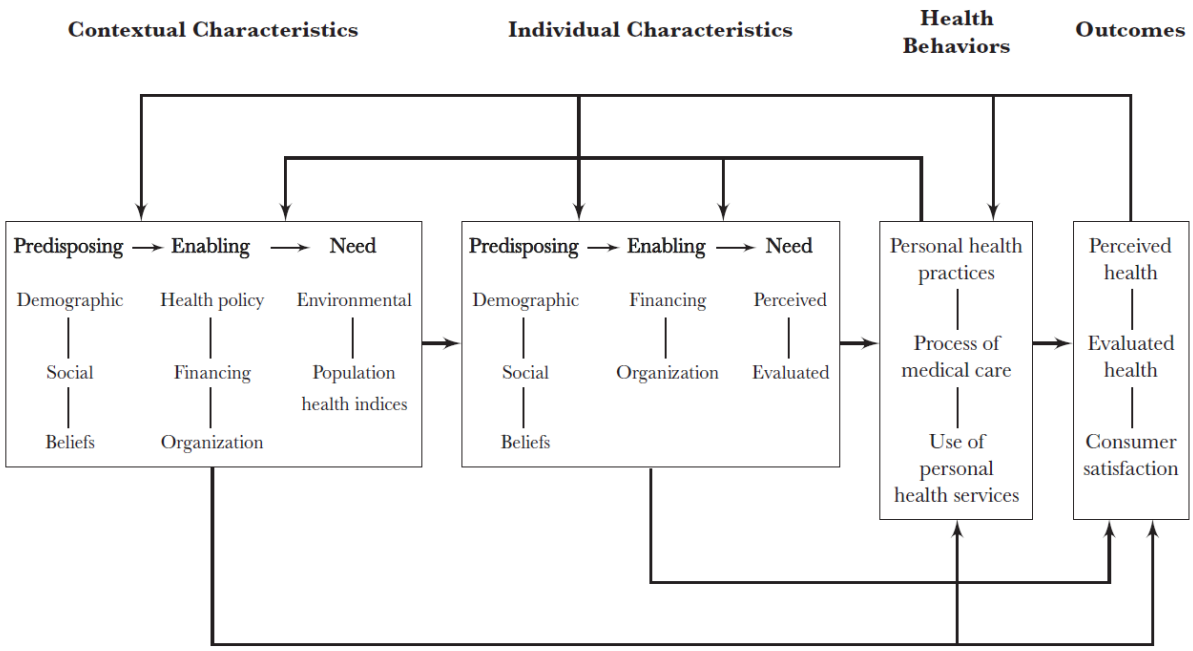

Figure 8. Behavioral model of health services use. From Andersen, Davidson, and Baumeister, In: Changing the U.S. health care system: Key issues in health services policy and management, 2014.[77]

In summary, this dissertation was conceptualized and conducted using three main conceptual models. We used Buot and colleagues' model to understand and examine the structural landscape of PrEP services infrastructure in the U.S. We used Penchansky and Thomas's model to conceptualize how to

measure such a structural landscape and the spatial accessibility of PrEP-providing clinics located in the U.S. Finally, we used Andersen's model to properly frame the spatial and structural determinants of PrEP healthcare utilization to estimate the association between these determinants and PrEP use among disproportionately affected MSM populations. With these models, we examined how structural and geographic determinants of health affect the usage of PrEP at the individual level (see **Figure 9**).

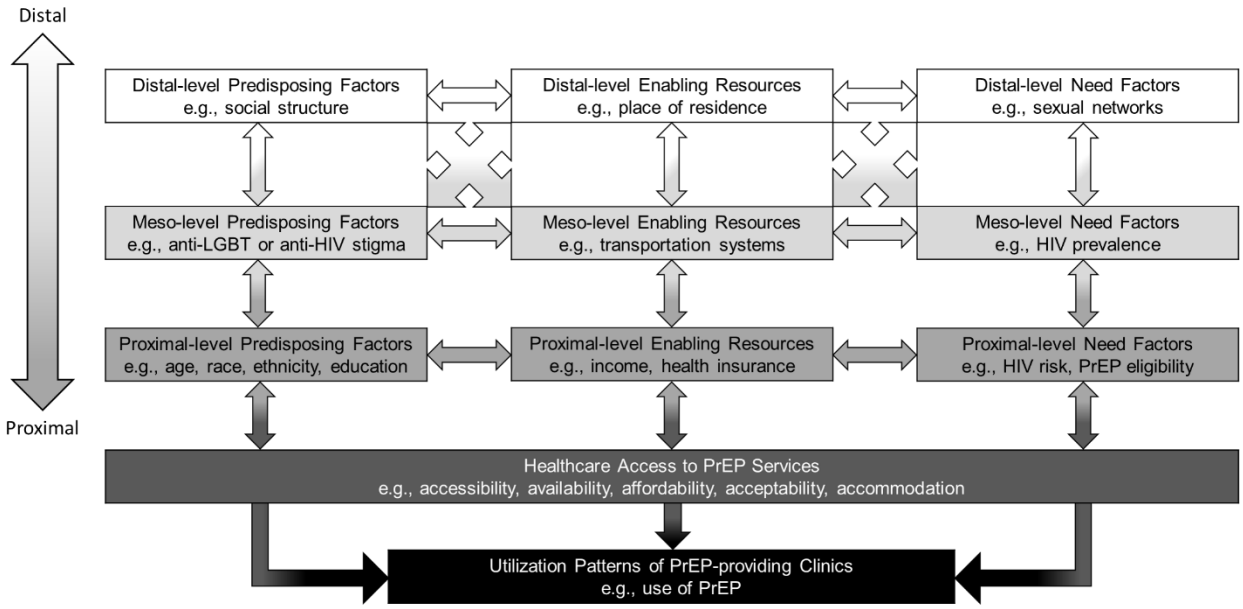

Figure 9. A simplified conceptual model of factors affecting PrEP accessibility and usage among disproportionately affected populations.

Research Motivation

Existing literature on the geographic accessibility of PrEP-providing clinics includes four general limitations. First, since PrEP was approved for use by FDA in 2012,[44] the number of PrEP-providing clinics in the U.S. has increased from 1,272 clinics in 2016[71] to 1,973 in 2017[73] and 2,094 in 2018.[74] Although PrEP accessibility and use are dependent on geography, it is unknown whether the increase in PrEP-providing clinics recently over time has altered the geographic patterns of PrEP deserts in the U.S. Second, existing research has identified stark differences in PrEP access by urbanicity, with significantly

lower access to and use of PrEP in rural and suburban areas compared to urban areas across the U.S.[73,74] However, very few studies have pursued efforts to disentangle the differences in measuring PrEP accessibility by urbanicity. Third, research has called for additional studies on how various modes of transportation affect access to and usage of PrEP services, which has not been examined.[73] Lastly, existing studies have yet to evaluate how area-level geographic accessibility of PrEP services affects actualized usage of PrEP at the individual level. This dissertation aims to address each of these gaps in the literature and contribute to existing research by providing insight into the spatiotemporal distribution of PrEP accessibility as well as the relationship between PrEP accessibility and PrEP use among disproportionately affected MSM populations across various levels of urbanicity.

Dissertation Aims

The objective of this dissertation is to address the aforementioned limitations in existing literature by extending Buot and colleagues' model of sociological determinants of HIV disparities, Penchansky and Thomas's model of healthcare access, and Andersen's behavioral model of health services use to better understand the different facets of PrEP accessibility that influence PrEP use. The overarching research goal of this dissertation is to utilize a multilevel, spatially informed approach to better conceptualize the geographic accessibility of PrEP-providing clinics by examining how areas of suboptimal PrEP access have spatially changed over time and how area-level elements of geographic access to PrEP services, such as travel time to care, transportation modes, and urbanicity, affect actualized individual-level usage of PrEP among MSM. The specific aims of this dissertation include the following:

Aim 1: To examine the geographic distribution of PrEP accessibility over time, and to characterize factors associated with the spatiotemporal distribution of PrEP accessibility.

Aim 2: To estimate the association between drive-time accessibility of PrEP-providing clinics and the use of PrEP among MSM residing in nonurban areas.

Aim 3: To estimate the association between transportation mode used to access healthcare services and persistent PrEP use among MSM residing in urban areas.

Dissertation Structure

First, Chapter 2 presents the findings of Dissertation Aim 1 as an original manuscript, where we used longitudinal geolocation coordinate data of PrEP-providing clinics, novel definitions for four types of spatiotemporal PrEP accessibility, and spatial network analysis methods to measure the change in the spatial extent of PrEP deserts and PrEP oases over time for census tracts in the U.S. We also used polytomous logistic regression to determine factors contributing to the changing geographic distribution of PrEP deserts and PrEP oases over time. Chapter 3 presents the findings of Dissertation Aim 2 as an original manuscript, where we used geolocation coordinate data of PrEP-providing clinics, data from a national cross-sectional, online-based survey of HIV risk behaviors and uptake of HIV prevention services, and multilevel log-binominal regression with generalized estimating equations to estimate the association between drive-time accessibility of PrEP clinics and PrEP use among MSM residing in ZIP codes located in nonurban areas. Chapter 4 presents the findings of Dissertation Aim 3 as an original manuscript, where we used data from a national cross-sectional, online-based survey of HIV risk behaviors and uptake of HIV prevention services and multilevel logistic regression with generalized estimating equations to estimate the association between modes of transportation used to access healthcare services and the persistent usage of PrEP among MSM residing in ZIP codes located in urban areas. Finally, Chapter 5 presents the synthesized findings of Chapters 2 through 4 in a concluding chapter, which describes the implications of the dissertation findings, innovation and contributions of the dissertation findings to existing literature, strengths and limitations of the dissertation analyses, and future research directions.

Chapter 2. The spatiotemporal distribution of pre-exposure prophylaxis accessibility in the United States, 2016-2020

Abstract

Residing in areas with little spatial accessibility to HIV pre-exposure prophylaxis (PrEP) providers, or PrEP deserts, contributes to low PrEP uptake. This study examines and characterizes the spatial distribution of PrEP accessibility in the United States over time. We conducted spatial network analyses and geographic mapping to explore the spatiotemporal distribution of persistent PrEP deserts (census tracts with suboptimal accessibility in 2016 and 2020), new PrEP deserts (tracts with suboptimal accessibility in 2020 but not 2016), new PrEP oases (tracts with suboptimal accessibility in 2016 but not 2020), and persistent PrEP oases (tracts with optimal accessibility in 2016 and 2020). We used polytomous logistic regression to determine area-level factors associated with these four spatiotemporal PrEP accessibility types. There was a reduction of 52.8% in the prevalence of 30-minute PrEP deserts from 2016 (28,055 tracts) to 2020 (13,240 tracts) and an increase of 33.5% in 30-minute PrEP oases from 2016 (44,259 tracts) to 2020 (59,074 tracts). Of all tracts, 12,487 (17.3%) were persistent PrEP deserts, 753 (1.0%) were new PrEP deserts, 15,568 (21.5%) were new PrEP oases, and 43,506 (60.1%) were persistent PrEP oases. Overall, persistent PrEP oases were more likely to be of higher socioeconomic status, racially/ethnically diverse, located in urban areas, and located in the Northeast compared with other spatiotemporal PrEP accessibility types, with variation by urbanicity and U.S. Census region. Efforts to improve PrEP accessibility should be especially focused in disadvantaged communities in nonurban areas and the South, Midwest, and West. Monitoring changes in the spatial accessibility of PrEP over time and determining the factors associated with such changes can help to evaluate progress made towards improving PrEP accessibility.

Introduction

In February 2019, the U.S. Department of Health and Human Services established the Ending the HIV Epidemic: A Plan for America (EHE) Initiative to end the current HIV epidemic by 2030.[1,8] The goals of the EHE Initiative are to decrease HIV incidence by 75% in 5 years and by 90% in 10 years, with an emphasis on expanding access to and uptake of daily oral HIV pre-exposure prophylaxis (PrEP) in geographic hot spots of the U.S.[1,8] PrEP is a biomedical intervention for preventing HIV transmission in persons living without HIV but who are at increased risk for HIV.[44,49] PrEP is highly effective in reducing HIV infection at the individual level by up to 99%.[34-43] Higher PrEP uptake has also been associated with decreases in annual HIV diagnosis rates by 1.3% at the state level.[51] While PrEP is an effective antiretroviral-based HIV prevention strategy and the prevalence of PrEP use has steadily increased over time,[52-54,93-95] levels of PrEP uptake remain much lower than the estimated 1.1 million persons who have indications for PrEP in the U.S.[3,4] Suboptimal spatial proximity to PrEP services is a significant contributor to such low uptake of PrEP.[64,65]

To increase the coverage of PrEP, persons with indications for PrEP need to be able to determine where the nearest, culturally competent clinics and healthcare providers who prescribe PrEP are located and be able to physically access such PrEP providers. PrEP Locator was developed to facilitate this need, serving as a national database to assist persons with an interest in and need for PrEP with locating PrEP-providing clinics and related services across the U.S.[71,72] When PrEP Locator was established in 2016, Siegler and colleagues identified a total of 1,272 unique PrEP-providing clinics.[71] In 2017, Siegler and colleagues reported 1,973 unique PrEP-providing clinics across the U.S., a 55% increase from the number of providers in 2016.[73] In 2018, Siegler and colleagues found the number of unique PrEP-providing clinics increased an additional 6% to 2,094 clinics.[74] Although the number of clinics and healthcare providers who prescribe PrEP grew by approximately 65% between 2016-2018, one in four U.S. census tracts have been determined to be PrEP deserts, or areas with limited spatial accessibility of greater than 30 minutes in drive time to the nearest PrEP provider.[73]

Access to PrEP services is influenced by several factors, such as cost, stigma, and the availability of PrEP providers among other facilitators and barriers.[96] However, spatial accessibility, such as the distance-related or travel time-related proximity to HIV-related healthcare services,[68,91,92] is especially important for the uptake of such healthcare services. Although research has established that the number of PrEP users and PrEP providers have risen over time, there is a gap in the existing literature as to the extent to which the spatial accessibility of PrEP services and prevalence of PrEP deserts has changed over time. Research is needed to better identify and characterize areas that have not persistently had optimal spatial accessibility to PrEP providers over time, especially since improving PrEP uptake and access is a foundational pillar of the EHE Initiative.[1,8] Thus, the objective of this study was to examine changes in the spatial distribution of PrEP accessibility between 2016 and 2020 and to characterize the factors contributing to the spatiotemporal distribution of PrEP accessibility in the U.S. The goal of this study was to clarify areas without persistent optimal spatial accessibility to PrEP services for which interventions of the EHE Initiative can be better tailored and implemented.

Methods

We conducted the present study using an ecologic study design to examine the spatiotemporal distribution of PrEP accessibility in the U.S. and factors associated with such a distribution. The study area of interest was the 48 states and Washington D.C. in the contiguous U.S. We excluded Alaska, Hawaii, and U.S. territories due to the limited network of interstates, highways, and primary and secondary streets in these areas. The limited road network in Alaska, Hawaii, and U.S. territories led to difficulty with calculating reliable travel accessibility measures in these areas, thus justifying the exclusion of these areas. The unit of analysis for this study was census tracts, which rendered a study population of 72,339 census tracts. The present study used aggregated, de-identified population-level data; thus, this study did not constitute human subjects research and, as such, was not subject to review by an institutional review board.

Data Sources

The PrEP Locator database was the data source for PrEP-providing clinics located in the U.S. Developed in 2016, PrEP Locator is a national database of approximately 4,000 registered healthcare institutions and providers that prescribe PrEP in the U.S.[71,72] Providers are included in PrEP Locator using a multi-step identification, verification, and validation process conducted by sexual health researchers, who also routinely update the database.[71,72] PrEP Locator provides the following data on PrEP providers: clinic or provider name, the full address of each clinic site, contact information for each clinic or provider, indications for the presence of PrEP financial navigation services, and indications for the presence of services for uninsured persons. [71,72] This study utilized data from PrEP Locator that comprise annual cross-sections of PrEP services in September 2016[71] (personal communication, Aaron Siegler) and September 2020 (provided by the Centers for Disease Control and Prevention (CDC) National Prevention Information Network).

The American Community Survey (ACS) was the primary data source for the covariates of interest. The ACS is a national survey of demographic and socioeconomic information on U.S. households. The U.S. Census Bureau administers the ACS to approximately one in 38 households, or more than 3.5 million households, on an annual basis during the years when the decennial census is not conducted.[97] This study utilized data from the 2014-2018 ACS Five-Year Estimates database since the Five-Year Estimates database is the most statistically reliable of the ACS databases when examining populations located in small geographic units, such as census tracts.[97] The U.S. Census Bureau Geographic Reference Files and the CDC National Center for Health Statistics (NCHS) were data sources for other covariates of interest.

Covariates of Interest

Covariates of interest included poverty, educational attainment, Black/African American population, Hispanic/Latino population, health insurance coverage, U.S. Census region, and urbanicity.

These variables were selected *a priori* based on our prior research.[73]

We obtained census tract-level data on poverty, educational attainment, Black/African American population, Hispanic/Latino population, and health insurance coverage from the 2014-2018 ACS Five-Year Estimates database by accessing the following ACS tables: B02001, B03001, S0601, and S2701. Data representing the percentage of persons identifying as Black or African American race were obtained from ACS table B02001. Data representing the percentage of persons identifying as Hispanic or Latino ethnicity were obtained from ACS table B03001. Data representing the percentage of persons with less than a high school education and the percentage of persons living below the federal poverty level were obtained from ACS table S0601. Data representing the percentage of persons in the civilian noninstitutionalized population without health insurance coverage were obtained from ACS table S2701.

We obtained data on the U.S. Census region (Northeast, Midwest, South, and West) designated for each U.S. state from the U.S. Census Bureau Geographic Reference Files.[98] We classified urbanicity for each census tract as a dichotomous variable: urban or nonurban. Using the 2013 NCHS Rural-Urban Classification Scheme,[99] census tracts were categorized as urban if they were located within a county designated as a large central metropolitan area.[100,101] Tracts were categorized as nonurban if they were located within a county designated as a large fringe metropolitan area, medium metropolitan area, small metropolitan area, micropolitan area, or non-core area.[100,101]

Outcome of Interest

The outcome of interest was the categorical type of spatiotemporal PrEP accessibility designated for each census tract in 2016 and 2020. To construct this outcome variable, we geocoded a total of 1,262 PrEP-providing clinics that were present in the contiguous U.S. in 2016, 3,875 PrEP-providing clinics that were present in the contiguous U.S. in 2020, and the geometric centroids of 72,339 census tracts in the contiguous U.S. Then, we used the ArcGIS Network Analyst extension to conduct a series of spatial network analyses to calculate the drive time (in minutes) from the geometric centroid of each census tract to the nearest PrEP-providing clinic in both 2016 and 2020 to categorize tracts as PrEP deserts or not for

both years. Based on previous PrEP desert research,[73] we used a threshold of 30 minutes to determine census tracts that were PrEP deserts, which were defined as tracts with a one-way drive time of greater than 30 minutes to the nearest PrEP-providing clinic. Census tracts were categorized as the following types of spatiotemporal PrEP accessibility:

- persistent PrEP desert, or a census tract defined as a 30-minute PrEP desert in 2016 and 2020
- new PrEP desert, or a census tract defined as a 30-minute PrEP desert in 2020 but not in 2016
- new PrEP oasis, or a census tract defined as a 30-minute PrEP desert in 2016 but not in 2020
- persistent PrEP oasis, or a census tract not defined as a 30-minute PrEP desert in 2016 and 2020

Statistical Analysis

To investigate the demographic, socioeconomic, and geographic factors associated with the four-level outcome variable, we conducted a descriptive analysis to compare characteristics of the covariates of interest stratified by type of spatiotemporal PrEP accessibility using frequencies with proportions and medians with interquartile ranges (IQR). We conducted unadjusted polytomous logistic regression analyses to assess the association between type of spatiotemporal PrEP accessibility and poverty, educational attainment, Black/African American population, Hispanic/Latino population, health insurance coverage, U.S. Census region, and urbanicity. Based on the results from the unadjusted analyses, we conducted a multivariable polytomous logistic regression analysis to assess the adjusted association between type of spatiotemporal PrEP accessibility and poverty, educational attainment, Black/African American population, Hispanic/Latino population, and health insurance coverage, overall as well as stratified by U.S. Census region and urbanicity. Unadjusted odds ratios (ORs) with 95% confidence intervals (CIs) and adjusted odds ratios (aORs) with 95% CIs were calculated from the unadjusted and adjusted polytomous logistic regression models, respectively. We conducted all geocoding, spatial network analyses, and geographic mapping using ArcMap version 10.7 and ArcGIS Pro version 2.3.3 (Esri, Redlands, CA). We performed data cleaning using RStudio version 1.1.456 (RStudio, Inc., Boston, MA) and statistical analyses using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results

In 2016, 26,794 (37.0%) census tracts were 0-15 minutes in drive time, 17,465 (24.1%) tracts were 16-30 minutes in drive time, 14,071 (19.5%) tracts were 31-60 minutes in drive time, 6,699 (9.3%) tracts were 61-90 minutes in drive time, 3,967 (5.5%) tracts were 91-120 minutes in drive time, and 3,318 (4.6%) tracts were more than 120 minutes in drive time from the nearest PrEP-providing clinic (see **Figure 10**). In 2020, 44,948 (62.1%) tracts were 0-15 minutes in drive time, 14,126 (19.5%) tracts were 16-30 minutes in drive time, 9,110 (12.6%) tracts were 31-60 minutes in drive time, 2,682 (3.7%) tracts were 61-90 minutes in drive time, 910 (1.3%) tracts were 91-120 minutes in drive time, and 538 (0.7%) tracts were more than 120 minutes in drive time from the nearest PrEP-providing clinic (see **Figure 10**). Overall, 28,055 (38.8%) tracts in 2016 and 13,240 (18.3%) tracts in 2020 were 30-minute PrEP deserts, a reduction of 52.8% over time in the prevalence of PrEP deserts; 44,259 (61.2%) tracts in 2016 and 59,074 (81.7%) tracts in 2020 were 30-minute PrEP oases, an increase of 33.5% over time in the prevalence of PrEP oases.

The spatiotemporal distribution of PrEP accessibility during 2016-2020 is presented (see **Figure 11**). Of all census tracts, 12,487 (17.3%) tracts were persistent PrEP deserts, 753 (1.0%) tracts were new PrEP deserts, 15,568 (21.5%) tracts were new PrEP oases, and 43,506 (60.1%) tracts were persistent PrEP oases. We were unable to determine the type of spatiotemporal PrEP accessibility for 25 (0.03%) tracts because these were relatively inaccessible areas with limited road networks, such as islands, national forests, national and state parks, and other natural areas. Persistent PrEP deserts were identified in all states with marked regional differences in the prevalence of this type of spatiotemporal PrEP accessibility. Most persistent PrEP oases were geographically located in or near metropolitan areas, and most new PrEP oases were neighboring communities of metropolitan areas. Most new PrEP deserts were in the Midwest and West.

Descriptive statistics of demographic, socioeconomic, and geographic characteristics stratified by

type of spatiotemporal PrEP accessibility are presented (see **Table 1**). New PrEP deserts (median: 14.4%; IQR: 8.9, 22.0%) and persistent PrEP deserts (median: 14.1%; IQR: 9.3, 20.8%) had the highest percentages of persons living in poverty. Persistent PrEP deserts (median: 12.2%; IQR: 7.8, 18.5%) and new PrEP deserts (median: 11.3%; IQR: 7.7, 17.1%) also had the highest percentages of persons without a high school education. Persistent PrEP deserts had higher percentages of persons without health insurance (median: 8.8%; IQR: 5.5, 13.4%) than persistent PrEP oases (median: 7.0%; IQR: 3.7, 12.0%). Persistent PrEP oases had the highest percentages of Black/African American persons (median: 5.8%; IQR: 1.7, 19.2%) and Hispanic/Latino persons (median: 10.1%; IQR: 3.8, 26.3%). Nearly all (98.9%) persistent PrEP deserts were in nonurban areas, whereas persistent PrEP oases were equally distributed among urban (48.6%) and nonurban areas (51.4%).

Results from the unadjusted and adjusted polytomous logistic regression models examining select demographic and socioeconomic factors associated with the spatiotemporal distribution of PrEP accessibility are presented (see **Table 2**). After adjusting for sociodemographic and geographic characteristics, persistent PrEP deserts (aOR: 1.02; 95% CI: 1.02, 1.02), new PrEP deserts (aOR: 1.03; 95% CI: 1.03, 1.04), and new PrEP oases (aOR: 1.02; 95% CI: 1.02, 1.02) were associated with higher levels of poverty in comparison with persistent PrEP oases. Regarding educational attainment, persistent PrEP deserts (aOR: 1.09; 95% CI: 1.08, 1.09), new PrEP deserts (aOR: 1.03; 95% CI: 1.02, 1.05), and new PrEP oases (aOR: 1.02; 95% CI: 1.02, 1.03) were associated with higher levels of persons without a high school education compared with persistent PrEP oases. Persistent PrEP deserts (aOR: 1.05; 95% CI: 1.05, 1.06), new PrEP deserts (aOR: 1.02; 95% CI: 1.00, 1.04), and new PrEP oases (aOR: 1.03; 95% CI: 1.02, 1.03) were also associated with higher levels of persons without health insurance. Compared with persistent PrEP oases, persistent PrEP deserts (aOR: 0.95; 95% CI: 0.94, 0.95), new PrEP deserts (aOR: 0.96; 95% CI: 0.95, 0.96), and new PrEP oases (aOR: 0.97; 95% CI: 0.97, 0.97) were associated with lower levels of persons identifying as Black/African American race. Persistent PrEP deserts (aOR: 0.94; 95% CI: 0.94, 0.94), new PrEP deserts (aOR: 0.98; 95% CI: 0.97, 0.98), and new PrEP oases (aOR: 0.98; 95% CI: 0.98, 0.98) were also associated with lower levels of persons identifying as Hispanic/Latino

ethnicity.

In unadjusted analyses, the geographic variables of interest (U.S. Census region and urbanicity) were strongly associated with the spatiotemporal distribution of PrEP accessibility (see **Table 2**). Compared with persistent PrEP oases, persistent PrEP deserts were more likely to be in the South (OR: 6.26; 95% CI: 5.78, 6.78), Midwest (OR: 5.76; 95% CI: 5.30, 6.25), and West (OR: 2.19; 95% CI: 2.01, 2.39) than in the Northeast. New PrEP deserts were also more likely to be in the Midwest (OR: 5.10; 95% CI: 3.80, 6.84), West (OR: 4.00; 95% CI: 2.98, 5.38), and South (OR: 2.90; 95% CI: 2.14, 3.92) when compared with persistent PrEP oases. New PrEP oases were more likely to be in the South (OR: 2.62; 95% CI: 2.49, 2.76) and Midwest (OR: 1.29; 95% CI: 1.22, 1.37) but not in the West (OR: 0.53; 95% CI: 0.50, 0.57) when compared with persistent PrEP oases. Regarding urbanicity, persistent PrEP deserts (OR: 84.49; 95% CI: 71.37, 100.03), new PrEP deserts (OR: 9.21; 95% CI: 7.20, 11.79), and new PrEP oases (OR: 10.27; 95% CI: 9.67, 10.90) were more likely to be in nonurban areas in comparison with persistent PrEP oases. Given the magnitude of the effect estimates for U.S. Census region and urbanicity, we conducted post hoc analyses further examining the associations between sociodemographic factors and spatiotemporal PrEP accessibility stratified by geography.

Associations between the spatiotemporal accessibility of PrEP and demographic and socioeconomic factors by urbanicity are presented (see **Table 3**). Across levels of urbanicity, persistent PrEP deserts, new PrEP deserts, and new PrEP oases were generally associated with higher levels of poverty and persons with no high school education or health insurance and lower levels of Black/African American and Hispanic/Latino persons compared with persistent PrEP oases. However, new PrEP deserts in urban areas were associated with lower levels of persons without a high school education (aOR: 0.96; 95% CI: 0.93, 1.00) and higher levels of persons identifying as Hispanic/Latino ethnicity (aOR: 1.03; 95% CI: 1.01, 1.04) in comparison with persistent PrEP oases. Also, in contrast with the overall results, new PrEP oases in urban areas were associated with lower levels of persons living in poverty (aOR: 0.99; 95% CI: 0.98, 0.99) and persons without a high school education (aOR: 0.95; 95% CI: 0.94, 0.96) as well as higher levels of Hispanic/Latino persons (aOR: 1.02; 95% CI: 1.01, 1.02) compared with persistent

PrEP oases.

Associations between sociodemographic factors and spatiotemporal PrEP accessibility by U.S. Census region are presented in (see **Table 4**). In general, persistent PrEP deserts, new PrEP deserts, and new PrEP oases across the Northeast, Midwest, South, and West were associated with higher levels of persons living in poverty, without a high school education, and without health insurance coverage as well as lower levels of Black/African American and Hispanic/Latino persons in comparison with persistent PrEP oases. However, persistent PrEP deserts in the South were associated with lower levels of persons without health insurance (aOR: 0.99; 95% CI: 0.99, 1.00) compared with persistent PrEP oases. Also, contrasting with the overall results, new PrEP deserts in the West were associated with lower levels of persons without a high school education (aOR: 0.94; 95% CI: 0.93, 0.96) and higher levels of Hispanic/Latino persons (aOR: 1.02; 95% CI: 1.01, 1.03) in comparison with persistent PrEP oases.

Discussion

To our knowledge, this is the first study to analyze the distribution of PrEP accessibility over space and time in the U.S. at the census tract level, presenting novel definitions for four types of spatiotemporal PrEP accessibility. Using a validated national database of nearly 4,000 PrEP-providing clinics, we found that the prevalence of PrEP deserts decreased by 52.8%, and the prevalence of PrEP oases increased by 33.5% between 2016-2020. Overall, 17.3% of census tracts were persistent PrEP deserts, and 60.1% were persistent PrEP oases between 2016-2020. We found ecological associations between lower levels of populations living in poverty, without a high school education, and without health insurance and the distribution of persistent PrEP oases compared with persistent PrEP deserts, new PrEP deserts, and new PrEP oases. These findings indicate the need for targeted placement of PrEP-providing clinics with financial navigation services and services for uninsured persons in areas that do not have consistent optimal spatial accessibility to PrEP services over time.

Persistent PrEP oases were characterized by higher levels of Black/African American and

Hispanic/Latino persons compared with the other spatiotemporal PrEP accessibility types. This finding may reflect the distribution of larger populations of racial/ethnic minorities in urban areas across the U.S.;[102] urban areas are more likely to be persistent PrEP oases with greater spatial accessibility to PrEP services. Despite this relative abundance of proximate PrEP providers in areas with higher proportions of racial/ethnic minorities, studies have found that racial/ethnic minorities in urban areas report less PrEP uptake than White persons.[103,104] Thus, the results from our study may not adequately account for other factors of PrEP access, such as transportation vulnerability, which can complicate access to healthcare services in areas with seemingly acceptable spatial accessibility as measured by estimated drive time.[82]

Also, geography, as measured by U.S. Census region and urbanicity, emerged as an important factor associated with the spatiotemporal distribution of PrEP accessibility in the U.S. In unadjusted analyses, persistent PrEP oases were more likely to be in urban areas than in nonurban areas and in the Northeast than in the Midwest, South, and West. These findings reflect previous research demonstrating that PrEP accessibility and coverage are higher in more urbanized areas as well as in the Northeast compared with other Census regions.[73,74] These findings signify that there may be a need for more PrEP-providing clinics and related services in nonurban areas across the Midwest, South, and West Census regions. Our overall findings are aligned with prior PrEP desert research.[73]

There were unexpected findings in the associations between sociodemographic factors and spatiotemporal PrEP accessibility by urbanicity and U.S. Census region. In urban areas and the West, new PrEP deserts had lower levels of persons with no high school education, yet higher levels of Hispanic/Latino persons compared with persistent PrEP oases. The development of such new PrEP deserts in areas with larger Hispanic/Latino populations indicates that additional emphasis on HIV prevention, especially PrEP access, in Hispanic/Latino communities may be needed.[105] Also, the expansion of urban and western new PrEP deserts in areas with smaller populations with low educational attainment may reflect the growing emphasis over time of prioritizing HIV prevention and PrEP access in areas with low socioeconomic status rather than high socioeconomic status.[106] Future research should consider further investigation of this unexpected association between the development of new PrEP

deserts and areas with relatively high levels of socioeconomic status and Hispanic/Latino populations.

The findings of this study are subject to several limitations. First, the PrEP Locator database may not capture all PrEP-providing clinics in the U.S. PrEP providers elect to be included in the PrEP Locator database; thus, some providers may be missing. However, each PrEP-providing clinic included in PrEP Locator is vetted to meet inclusion standards regardless of their location in geographic region or urbanicity, rendering a validated database of nearly 4,000 PrEP providers across the U.S.[71,72] Moreover, persons seeking PrEP might be limited in their search to using such publicly available databases. Second, we used single geographic points (geometric centroids) to measure PrEP accessibility for U.S. census tracts, which may overestimate or underestimate drive times to the nearest PrEP-providing clinic for different areas within a tract. Because census tracts are based on a target number of inhabitants, census tracts in rural areas may be geographically larger than those in urban areas, and the lack of precision for estimation of driving times might be a larger issue for rural census tracts.

Third, the urban-nonurban classification used in our study is only one approach to defining urbanicity, and there may be other appropriate ways to categorize urban and nonurban areas. As justification, we have shown that suburban and other less urbanized areas exhibit patterns of PrEP accessibility that distinctly differ from that in urban areas,[73,74] and existing PrEP literature has used urban-nonurban categorizations similar to the classification used in our study.[100,101] Future studies may elect to compare different urban-nonurban definitions to further examine the relationship between urbanicity and the spatial accessibility of PrEP-providing clinics. Fourth, we assumed the closest PrEP-providing clinic would be the provider of choice, which may lead to mismeasurement of PrEP access; factors other than proximity may shape preferences for one clinic over another.

Fifth, we defined and identified spatiotemporal PrEP accessibility using drive time by private car as the accessibility measure of choice. Other measures of access, such as travel time by public transit or walking, may be more pertinent for some areas across the U.S., such as more urbanized communities. Also, drive time by private car is a measure of access that is relevant when persons need to physically access a PrEP provider, but we did not consider the use of telehealth or mail-order delivery for measuring

PrEP accessibility. Future research should consider alternate measures of access. Finally, findings of this study pertain to spatial accessibility and do not represent other barriers or facilitators to accessing PrEP services, including type of insurance accepted, concerns about confidentiality, and languages in which services are provided. Despite these limitations, we believe the findings of this study are valuable additions to the literature on PrEP deserts as they add to the understanding of the changing dynamic of PrEP accessibility spatially and longitudinally.

Conclusions

With expanding access to PrEP being a focus of the EHE Initiative, there is great interest in exploring changes in the spatial distribution of PrEP accessibility over time and understanding the factors influencing these changes in efforts to evaluate progress towards improving spatial PrEP accessibility. Using a national database of PrEP-providing clinics, we examined the spatial distribution of PrEP accessibility in the U.S. between 2016-2020 and characterized the factors contributing to this spatiotemporal distribution. We reported a decrease in the prevalence of PrEP deserts by 53% and an increase in PrEP oases by 34% during the study period, suggesting broadening spatial accessibility to PrEP; however, nearly one in six U.S. census tracts were identified as persistent PrEP deserts between 2016-2020. Higher levels of socioeconomic status and racial/ethnic diversity were associated with the spatiotemporal patterns of persistent PrEP oases. Areas located in urban localities and the Northeast were also strongly associated with the distribution of persistent PrEP oases. The findings of this study can support public health officials, policymakers, and stakeholders of the EHE Initiative with guiding targeted PrEP-related interventions and HIV prevention funding in areas that have not persistently had optimal spatial accessibility to PrEP-providing clinics over time.

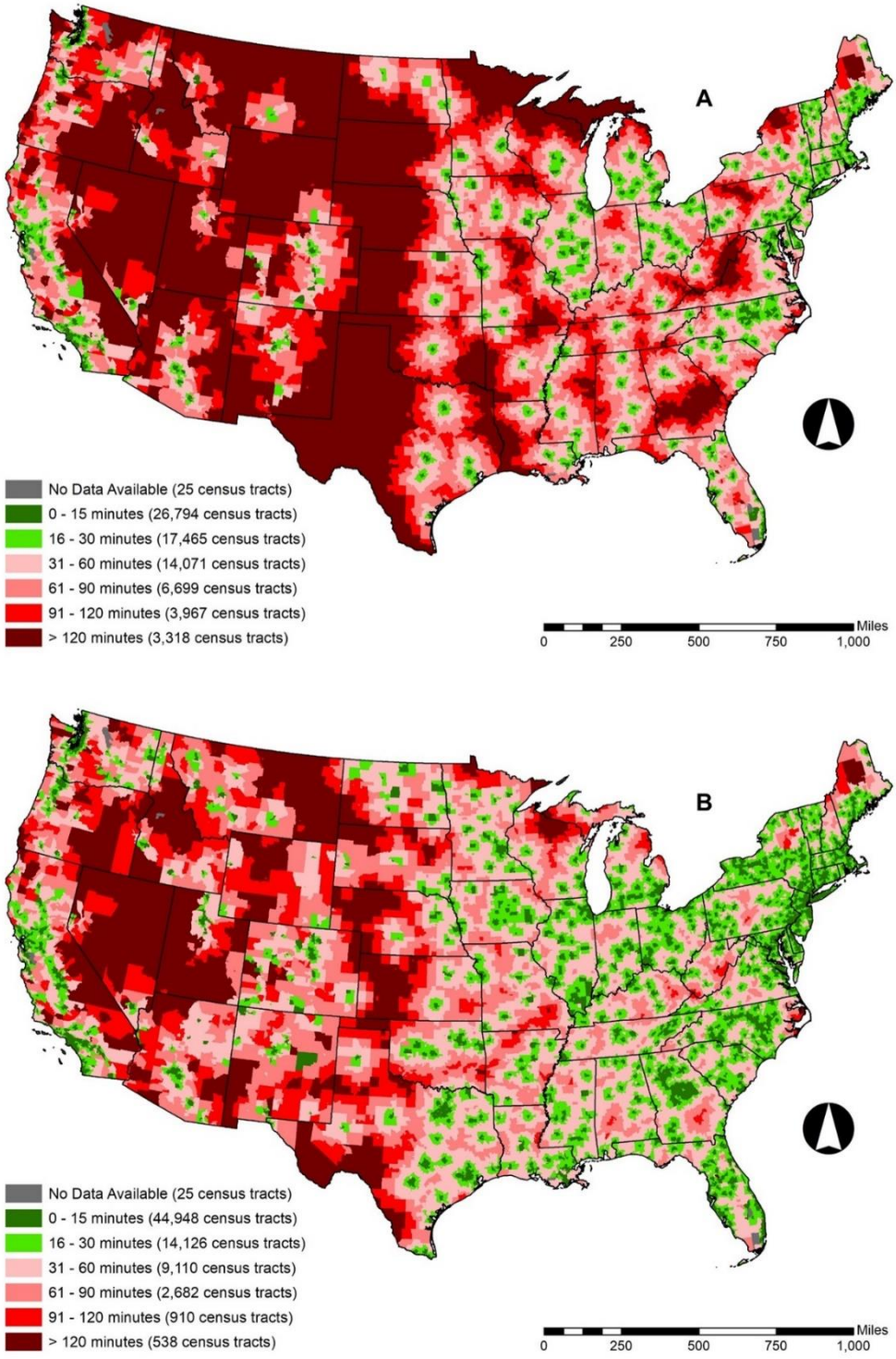

Figure 10. (A) Drive Time to the Nearest Pre-exposure Prophylaxis (PrEP) Clinic in the Contiguous United States, 2016. (B) Drive Time to the Nearest Pre-exposure Prophylaxis (PrEP) Clinic in the Contiguous United States, 2020.

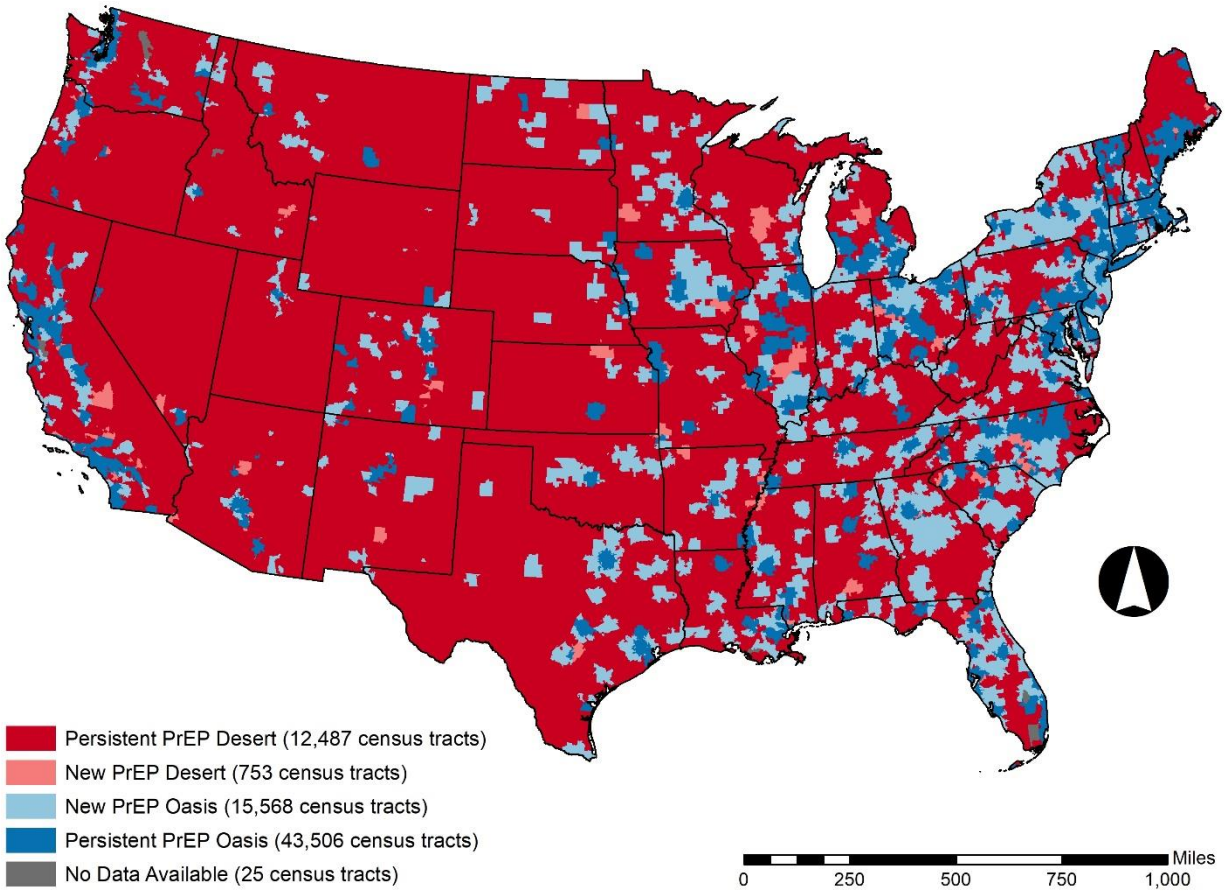

Figure 11. The Spatiotemporal Distribution of Pre-exposure Prophylaxis (PrEP) Accessibility in the Contiguous United States, 2016-2020.

Table 1. Descriptive statistics of demographic, socioeconomic, and geographic characteristics by spatiotemporal pre-exposure prophylaxis (PrEP) accessibility type — United States, 2016-2020.

	Total Census Tracts	Persistent PrEP Desert	New PrEP Desert	New PrEP Oasis	Persistent PrEP Oasis
	72,339	12,487	753	15,568	43,506
Characteristics					
% living in poverty[a]	11.9% (6.4-20.6%)	14.1% (9.3-20.8%)	14.4% (8.9-22.0%)	12.1% (6.7-20.7%)	10.9% (5.6-20.4%)
% no high school education[a]	10.0% (5.3-17.6%)	12.2% (7.8-18.5%)	11.3% (7.7-17.1%)	9.9% (5.7-16.6%)	9.2% (4.5-17.8%)
% Black/African American[a]	4.3% (1.0-15.5%)	1.1% (0.2-6.2%)	1.7% (0.4-5.7%)	3.8% (0.8-13.5%)	5.8% (1.7-19.2%)
% Hispanic/Latino[a]	7.4% (2.6-20.5%)	3.4% (1.3-9.5%)	6.5% (2.1-26.7%)	5.4% (2.1-13.9%)	10.1% (3.8-26.3%)
% without health insurance[a]	7.6% (4.2-12.6%)	8.8% (5.5-13.4%)	7.8% (5.2-12.1%)	8.0% (4.5-13.1%)	7.0% (3.7-12.0%)
U.S. Census Region[b]					
Northeast	13,510 (18.7%)	757 (6.1%)	54 (7.2%)	2,600 (16.7%)	10,097 (23.2%)
Midwest	17,028 (23.5%)	4,101 (32.8%)	259 (34.4%)	3,164 (20.3%)	9,502 (21.8%)
South	26,228 (36.3%)	5,694 (45.6%)	188 (25.0%)	8,198 (52.7%)	12,136 (27.9%)
West	15,573 (21.5%)	1,935 (15.5%)	252 (33.5%)	1,606 (10.3%)	11,771 (27.1%)
Urbanicity[b]					
Urban	22,655 (31.3%)	138 (1.1%)	70 (9.3%)	1,311 (8.4%)	21,129 (48.6%)
Nonurban	49,684 (68.7%)	12,349 (98.9%)	683 (90.7%)	14,257 (91.6%)	22,377 (51.4%)

[a]Results are presented as median (interquartile range).
[b]Results are presented as N (%).

Table 2. Unadjusted and adjusted associations between spatiotemporal pre-exposure prophylaxis (PrEP) accessibility type and demographic, socioeconomic, and geographic characteristics — United States, 2016-2020.

	Persistent PrEP Desert[a]		New PrEP Desert[a]		New PrEP Oasis[a]	
	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model
Characteristics						
% living in poverty[b]	**1.01 (1.01-1.01)**	**1.02 (1.02-1.02)**	**1.01 (1.01-1.02)**	**1.03 (1.03-1.04)**	**1.00 (1.00-1.01)**	**1.02 (1.02-1.02)**
% no high school education[c]	**1.01 (1.01-1.01)**	**1.09 (1.08-1.09)**	1.00 (1.00-1.01)	**1.03 (1.02-1.05)**	**1.00 (0.99-1.00)**	**1.02 (1.02-1.03)**
% Black/African American[d]	**0.97 (0.97-0.97)**	**0.95 (0.94-0.95)**	**0.97 (0.96-0.97)**	**0.96 (0.95-0.96)**	**0.99 (0.99-0.99)**	**0.97 (0.97-0.97)**
% Hispanic/Latino[e]	**0.97 (0.97-0.97)**	**0.94 (0.94-0.94)**	**0.99 (0.99-1.00)**	**0.98 (0.97-0.98)**	**0.99 (0.98-0.99)**	**0.98 (0.98-0.98)**
% without health insurance[f]	**1.02 (1.02-1.03)**	**1.05 (1.05-1.06)**	1.01 (1.00-1.02)	**1.02 (1.00-1.04)**	**1.02 (1.01-1.02)**	**1.03 (1.02-1.03)**
U.S. Census Region						
Northeast	Referent	-	Referent	-	Referent	-
Midwest	**5.76 (5.30-6.25)**	**-**	**5.10 (3.80-6.84)**	**-**	**1.29 (1.22-1.37)**	**-**
South	**6.26 (5.78-6.78)**	**-**	**2.90 (2.14-3.92)**	**-**	**2.62 (2.49-2.76)**	**-**
West	**2.19 (2.01-2.39)**	**-**	**4.00 (2.98-5.38)**	**-**	**0.53 (0.50-0.57)**	**-**
Urbanicity						
Urban	Referent	-	Referent	-	Referent	-
Nonurban	**84.49 (71.37-100.03)**	**-**	**9.21 (7.20-11.79)**	**-**	**10.27 (9.67-10.90)**	**-**

Notes: Results are presented as odds ratio (95% confidence intervals). Bold values indicate statistical significance at $P < 0.05$.

[a]The reference group is Persistent PrEP Oasis.

[b]The adjusted model controls for educational attainment, Black/African American population, Hispanic/Latino population, health insurance coverage, U.S. Census region, and urbanicity.

[c]The adjusted model controls for poverty, Black/African American population, Hispanic/Latino population, health insurance coverage, U.S. Census region, and urbanicity.

[d]The adjusted model controls for poverty, educational attainment, Hispanic/Latino population, health insurance coverage, U.S. Census region, and urbanicity.

[e]The adjusted model controls for poverty, educational attainment, Black/African American population, health insurance coverage, U.S. Census region, and urbanicity.

[f]The adjusted model controls for poverty, educational attainment, Black/African American population, Hispanic/Latino population, U.S. Census region, and urbanicity.

Table 3. Adjusted associations between spatiotemporal pre-exposure prophylaxis (PrEP) accessibility type and demographic and socioeconomic characteristics by urbanicity — United States, 2016-2020.

	Persistent PrEP Desert[a]	New PrEP Desert[a]	New PrEP Oasis[a]
Characteristics			
Urban			
% living in poverty[b]	0.98 (0.95-1.00)	0.99 (0.95-1.02)	**0.99 (0.98-0.99)**
% no high school education[c]	**1.04 (1.01-1.06)**	**0.96 (0.93-1.00)**	**0.95 (0.94-0.96)**
% Black/African American[d]	**0.93 (0.90-0.95)**	**0.94 (0.90-0.98)**	**0.99 (0.98-0.99)**
% Hispanic/Latino[e]	**0.98 (0.97-0.99)**	**1.03 (1.01-1.04)**	**1.02 (1.01-1.02)**
% without health insurance[f]	0.99 (0.95-1.03)	0.96 (0.91-1.01)	**1.05 (1.04-1.06)**
Nonurban			
% living in poverty[b]	**1.02 (1.02-1.02)**	**1.04 (1.03-1.05)**	**1.02 (1.01-1.02)**
% no high school education[c]	**1.09 (1.09-1.10)**	**1.04 (1.03-1.05)**	**1.04 (1.03-1.04)**
% Black/African American[d]	**0.95 (0.95-0.95)**	**0.95 (0.94-0.96)**	**0.98 (0.98-0.98)**
% Hispanic/Latino[e]	**0.93 (0.93-0.94)**	**0.97 (0.97-0.98)**	**0.96 (0.96-0.96)**
% without health insurance[f]	**1.10 (1.09-1.10)**	**1.05 (1.03-1.07)**	**1.08 (1.07-1.08)**

Notes: Results are presented as odds ratio (95% confidence intervals). Bold values indicate statistical significance at $P < 0.05$.

[a]The reference group is Persistent PrEP Oasis.

[b]The adjusted model controls for educational attainment, Black/African American population, Hispanic/Latino population, and health insurance coverage stratified by urbanicity.

[c]The adjusted model controls for poverty, Black/African American population, Hispanic/Latino population, and health insurance coverage stratified by urbanicity.

[d]The adjusted model controls for poverty, educational attainment, Hispanic/Latino population, and health insurance coverage stratified by urbanicity.

[e]The adjusted model controls for poverty, educational attainment, Black/African American population, and health insurance coverage stratified by urbanicity.

[f]The adjusted model controls for poverty, educational attainment, Black/African American population, and Hispanic/Latino population stratified by urbanicity.

Table 4. Adjusted associations between spatiotemporal pre-exposure prophylaxis (PrEP) accessibility type and demographic and socioeconomic characteristics by U.S. Census region — United States, 2016-2020.

	Persistent PrEP Desert[a]	New PrEP Desert[a]	New PrEP Oasis[a]
Characteristics			
Northeast			
% living in poverty[b]	**1.04 (1.03-1.05)**	0.98 (0.94-1.03)	**1.03 (1.02-1.03)**
% no high school education[c]	**1.02 (1.00-1.04)**	**1.05 (1.01-1.10)**	**1.01 (1.00-1.02)**
% Black/African American[d]	**0.89 (0.87-0.91)**	**0.84 (0.75-0.94)**	**0.97 (0.97-0.98)**
% Hispanic/Latino[e]	**0.82 (0.80-0.84)**	**0.93 (0.90-0.97)**	**0.95 (0.94-0.95)**
% without health insurance[f]	**1.13 (1.11-1.15)**	**1.10 (1.04-1.16)**	**1.03 (1.02-1.04)**
Midwest			
% living in poverty[b]	**1.02 (1.02-1.03)**	**1.05 (1.04-1.06)**	**1.02 (1.02-1.03)**
% no high school education[c]	**1.12 (1.11-1.13)**	**1.12 (1.09-1.15)**	**1.06 (1.05-1.07)**
% Black/African American[d]	**0.81 (0.80-0.82)**	**0.79 (0.76-0.83)**	**0.94 (0.93-0.94)**
% Hispanic/Latino[e]	**0.91 (0.91-0.92)**	**0.89 (0.87-0.91)**	**0.94 (0.94-0.95)**
% without health insurance[f]	**1.06 (1.05-1.08)**	**1.05 (1.02-1.08)**	**1.01 (1.00-1.03)**
South			
% living in poverty[b]	**1.03 (1.03-1.04)**	**1.03 (1.01-1.05)**	**1.02 (1.02-1.03)**
% no high school education[c]	**1.13 (1.12-1.13)**	**1.08 (1.06-1.11)**	**1.05 (1.04-1.05)**
% Black/African American[d]	**0.95 (0.95-0.95)**	**0.97 (0.96-0.98)**	**0.97 (0.97-0.97)**
% Hispanic/Latino[e]	**0.94 (0.94-0.94)**	**0.96 (0.95-0.97)**	**0.97 (0.97-0.98)**
% without health insurance[f]	**0.99 (0.99-1.00)**	0.99 (0.96-1.02)	1.00 (1.00-1.01)
West			
% living in poverty[b]	**1.03 (1.02-1.04)**	**1.05 (1.04-1.07)**	**1.03 (1.02-1.03)**
% no high school education[c]	**1.04 (1.03-1.05)**	**0.94 (0.93-0.96)**	**1.02 (1.01-1.03)**
% Black/African American[d]	**0.74 (0.72-0.76)**	**0.90 (0.87-0.93)**	**0.86 (0.85-0.88)**
% Hispanic/Latino[e]	**0.95 (0.94-0.95)**	**1.02 (1.01-1.03)**	**0.97 (0.97-0.98)**
% without health insurance[f]	**1.08 (1.07-1.09)**	1.01 (0.98-1.03)	**1.03 (1.01-1.04)**

Notes: Results are presented as odds ratio (95% confidence intervals). Bold values indicate statistical significance at $P < 0.05$.

[a]The reference group is Persistent PrEP Oasis

[b]The adjusted model controls for educational attainment, Black/African American population, Hispanic/Latino population, and health insurance coverage stratified by U.S. Census region.

[c]The adjusted model controls for poverty, Black/African American population, Hispanic/Latino population, and health insurance coverage stratified by U.S. Census region.

[d]The adjusted model controls for poverty, educational attainment, Hispanic/Latino population, and health insurance coverage stratified by U.S.

Census region.
[e]The adjusted model controls for poverty, educational attainment, Black/African American population, and health insurance coverage stratified by U.S. Census region.
[f]The adjusted model controls for poverty, educational attainment, Black/African American population, and Hispanic/Latino population stratified by U.S. Census region.

Chapter 3. Association between the geographic accessibility of pre-exposure prophylaxis and use of pre-exposure prophylaxis among men who have sex with men in nonurban areas

Abstract

The U.S. HIV epidemic has become a public health issue that increasingly affects men who have sex with men (MSM), including those residing in nonurban areas. Increasing access to pre-exposure prophylaxis (PrEP) in nonurban areas will prevent HIV acquisition and could address the growing HIV epidemic. No studies have quantified the associations between PrEP access and PrEP use among nonurban MSM. Using 2020 PrEP Locator data and American Men's Internet Survey data, we conducted multilevel log-binomial regression to examine the association between area-level geographic accessibility of PrEP-providing clinics and individual-level PrEP use among MSM residing in nonurban areas in the U.S. Of 4,792 PrEP-eligible nonurban MSM, 20.1% resided in a PrEP desert (defined as more than a 30-minute drive to access PrEP), and 15.2% used PrEP in the past 12 months. In adjusted models, suburban MSM residing in PrEP deserts were less likely to use PrEP in the past year (adjusted prevalence ratio (aPR) = 0.35; 95% confidence interval (CI) = 0.15, 0.80) than suburban MSM not residing in PrEP deserts, and other nonurban MSM residing in PrEP deserts were less likely to use PrEP in the past year (aPR = 0.75; 95% CI = 0.60, 0.95) than other nonurban MSM not residing in PrEP deserts. Interventions designed to decrease barriers to PrEP access that are unique to nonurban areas in the U.S. are needed to address the growing HIV epidemic in these communities.

Introduction

The HIV epidemic in the United States (U.S.) is a public health issue that originated and remains well established in metropolitan areas, but it is steadily becoming an epidemic affecting nonurban areas.[21,24,107,108] Epidemiologic trends in recent years reveal increasing HIV burden in nonmetropolitan areas in the U.S., with such areas reporting an overall HIV diagnosis rate of 5.0 per 100,000 population in 2017 and an overall HIV prevalence of 119.3 per 100,000 population in 2016, which indicate greater rates than those of several metropolitan statistical areas in the U.S.[24] Nonurban areas are not only being increasingly affected by HIV, but they are also largely affected by poor healthcare infrastructure. There is a dearth of primary care physicians, HIV specialty clinics, and adequate transportation systems to access these providers and services in rural and suburban areas across the U.S., hindering efforts to reduce the HIV epidemic in these less urbanized areas.[108-114] Pre-exposure prophylaxis (PrEP) is an antiretroviral medication that is efficacious for HIV prevention in HIV-negative persons at increased risk for HIV infection,[34-43,49,50] and scaling up this biomedical intervention in nonurban areas can help address the growing HIV epidemic in these areas.

Men who have sex with men (MSM) residing in nonurban areas across the U.S. have lower usage levels of HIV prevention services, including PrEP, than MSM in urban areas,[100,101,115,116] and access to PrEP providers is a contributor to this disparity.[64,65,73,74,117,118] Similar to other HIV-related healthcare services, PrEP services are not always available to persons residing in nonurban localities of the U.S. Studies have shown that there is a scarcity of PrEP-providing clinics and PrEP-knowledgeable providers in rural and suburban communities across the U.S., with less urbanized areas more likely to be PrEP deserts (i.e., areas with limited geographic accessibility to PrEP providers).[73,74,117-119] Also, even when primary care physicians in rural areas are aware of or knowledgeable about PrEP, they often recommend patients with PrEP indications seek PrEP care with infectious disease or HIV specialists in urban areas.[117-119] Rural MSM who are able to access PrEP services may travel to metropolitan localities for adequate PrEP care, often driving at least 30 minutes and up to 2.5 hours to access a PrEP-providing clinic and

ancillary PrEP care services.[117,119] Moreover, aside from the lack of PrEP providers, there are also sociocontextual factors nonurban MSM experience that impede PrEP access.[117-119] For instance, accessing quality PrEP care in affirming and confidential spaces can be difficult. Some providers in nonurban areas may have biased, sex-negative, and stigmatizing views about PrEP.[117-119] Thus, the challenges populations at high risk for HIV infection, such as MSM, encounter when attempting to access PrEP medication and quality PrEP care are exacerbated in nonurban areas.

There is limited existing research on the geographic accessibility and usage of PrEP among populations at increased risk for HIV who reside in nonurban areas across the U.S. because most studies on PrEP access and use have been conducted using populations sampled from urban areas.[62,104,120-123] Moreover, previous studies that have been conducted to examine PrEP accessibility among MSM in nonurban areas have largely been qualitative in nature.[117-119] Thus, research is needed to address these gaps in knowledge by quantitatively estimating the association between PrEP accessibility and the use of PrEP among MSM residing in nonurban areas. Identifying barriers to PrEP accessibility, such as drive time to PrEP providers, and understanding the effect of these barriers on PrEP use among nonurban MSM are high-priority considering the U.S. "Ending the HIV Epidemic" (EHE) Initiative. The EHE Initiative emphasizes improving HIV prevention efforts, including expanding PrEP access and uptake, in states with a disproportionate number of new HIV infections in rural areas.[1,8,31] In this study, we assessed the association between area-level drive-time accessibility of PrEP-providing clinics and the usage of PrEP at the individual level among MSM residing in nonurban areas in the U.S. Also, because studies have reported unexpected findings regarding the distribution of PrEP deserts in suburban areas[73] and PrEP uptake in these areas,[100] we examined the effect of PrEP accessibility on PrEP use as modified by type of nonurban area (suburban area versus other nonurban area).

Methods

Study Population

The American Men's Internet Survey (AMIS) is a national repeated cross-sectional online survey of HIV risk behaviors and uptake of HIV prevention services among MSM in the U.S.[124-129] There have been eight AMIS cycles completed between 2013 and 2020, with each cycle collecting data from an estimated 10,000 MSM. For this study, AMIS participants were recruited through convenience sampling using banner advertisements (ads) on websites and social media applications frequented by MSM or through email blasts to members of MSM-frequented websites. Email recruitment was also extended to participants from previous AMIS cycles who consented to being recontacted for future research studies.

Participants were eligible for AMIS if they identified as cisgender male, were at least 15 years of age, resided in a valid U.S. ZIP code, and identified as gay or bisexual or reported ever having oral or anal sex with a man. Participants who clicked on AMIS study ads, met the eligibility criteria, and provided consent were immediately directed to the online survey. AMIS data were collected and stored using a secure server administered by Alchemer (Boulder, Colorado, U.S.). AMIS participation was not incentivized. The AMIS study was reviewed and approved by the Emory University Institutional Review Board.

The study population for the present study is comprised of MSM who participated in the 2020 cycle of AMIS (AMIS-2020), reported an HIV-negative or unknown serostatus, were PrEP-eligible, and resided in nonurban ZIP codes in the contiguous U.S. Using an algorithm based on clinical guidelines by the Centers for Disease Control and Prevention, we determined PrEP eligibility on the basis of whether study participants met either of the following criteria: (1) had a main male sexual partner with HIV or (2) had two or more male sexual partners in the past 12 months AND either any condomless anal sex with a man in the past 12 months or a diagnosis of any sexually transmitted infection, including gonorrhea, chlamydia, and syphilis, in the past 12 months.[48,101] Using the 2013 NCHS Rural-Urban Classification Scheme, MSM resided in nonurban ZIP codes if their respective ZIP codes were located within large fringe metropolitan, medium metropolitan, small metropolitan, micropolitan, and non-core counties.[99]

Study Measures

Our primary explanatory variable was drive-time accessibility of PrEP-providing clinics, a ZIP code-level variable measured by whether a participant's ZIP code of residence was classified as being a PrEP desert. We obtained geographic postal code boundaries for five-digit ZIP codes in the contiguous U.S. for the period of March 2020 from TomTom (Amsterdam, Netherlands), a commercial vendor that creates and regularly updates U.S. ZIP code boundaries based on the most current and complete postal information available from the U.S. Postal Service. We matched the geographic ZIP code boundaries from TomTom to ZIP codes reported by the study participants and computed the geometric centroid of each participant's ZIP code. We obtained geolocation data for 3,875 PrEP-providing clinics present in the contiguous U.S. in September 2020 from the PrEP Locator database, a U.S. database of registered healthcare providers that prescribe PrEP.[71] PrEP Locator is a national, validated, and frequently updated database that includes vetted PrEP providers using a standardized identification and verification process conducted by HIV researchers.[71] Using the ArcGIS Network Analyst extension, we ran a spatial network analysis to compute the drive time from the centroid of each participant's ZIP code to the nearest PrEP-providing clinic. Based on prior research,[73] participants were categorized as living in a PrEP desert if they resided in a ZIP code with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.

The outcome of interest was the report of recent PrEP use, an individual-level variable obtained from the AMIS-2020 study. In AMIS-2020, participants were asked the following: "In the past 12 months, have you taken PrEP?" Participants could respond with any of the following options: "No," "Yes," "I prefer not to answer," or "Don't know." Recent PrEP use was measured dichotomously, with recent use indicated by participants who responded "Yes" to having taken PrEP in the past 12 months and no recent use indicated by participants who responded "No" to having taken PrEP in the past 12 months.

AMIS-2020 study participants reported data on covariates, including age, race/ethnicity, educational attainment, annual household income, health insurance coverage, healthcare stigma, and geography. Age was categorized as 15-24 years, 25-29 years, 30-39 years, and 40 years and older. Race/ethnicity was categorized as non-Hispanic White, non-Hispanic Black, Hispanic, and other or

multiple races. Educational attainment was dichotomized as having a high school diploma or less or having at least some college education. Annual household income was categorized as $0-$19,999, $20,000-$39,999, $40,000-$74,999, and $75,000 or more. Health insurance coverage was categorized as private health insurance only, public health insurance only, other or multiple forms of health insurance, or no form of health insurance. Participants reported anticipated healthcare stigma, which was measured by asking participants if they felt afraid to go to or avoided healthcare services because of fear someone may learn they had sex with men.[130] Participants also reported enacted healthcare stigma, which was measured by asking participants whether they heard healthcare providers gossiping about them or had not been treated well by healthcare providers because they had sex with men.[130] Anticipated and enacted healthcare stigma were both dichotomized as ever or never experiencing the specific type of healthcare stigma. Participants reported state of residence, from which region of residence was defined using U.S. Census Bureau designations (Northeast, Midwest, South, and West). For our study, we further categorized nonurban ZIP codes as suburban (large fringe metropolitan) or other nonurban (medium metropolitan, small metropolitan, micropolitan, and non-core) based on existing literature.[100,101] These covariates were selected as confounders *a priori* based on previous research[52,53,73,74,100,101,115,130] and using a directed acyclic graph.

Statistical Analysis

We computed descriptive statistics among the study population for age, race/ethnicity, educational attainment, annual household income, health insurance coverage, anticipated and enacted healthcare stigma, U.S. Census region, nonurban ZIP code type, and PrEP desert status of participants' ZIP codes by use of PrEP in the past 12 months. We conducted unadjusted multilevel regression analyses using log-binominal generalized estimating equations (GEEs) with an exchangeable working correlation structure to examine the associations between demographic, socioeconomic, and geographic characteristics and PrEP use in the past year. Then, we conducted a series of multivariable multilevel regression analyses using log-binominal GEEs with an exchangeable working correlation structure to

examine the adjusted association between PrEP desert status of participants' ZIP codes and PrEP use in the past year. Model 1 adjusted for demographic and socioeconomic factors (age, race/ethnicity, educational attainment, annual household income, health insurance coverage, and anticipated and enacted healthcare stigma). Model 2 additionally adjusted for geographic factors (U.S. Census region and nonurban ZIP code type), and Model 3 additionally included an interaction term between PrEP desert status and nonurban ZIP code type. Prevalence ratios (PR) with 95% confidence intervals (CIs) were calculated from the unadjusted multilevel log-binomial regression models, and adjusted prevalence ratios (aPR) with 95% CIs were calculated from the multivariable multilevel log-binomial regression models. Since one's sexual behavior, and consequently PrEP eligibility, can vary over time, we also conducted sensitivity analyses to include AMIS-2020 study participants with a negative or unknown HIV status who were not eligible for PrEP at the time of the survey. We used ArcGIS Pro version 2.3.3 (Environmental Systems Research Institute, Redlands, CA) for the spatial network analysis and SAS version 9.4 (SAS Institute, Cary, NC) for all statistical analyses.

Results

Overall, 4,792 MSM participating in AMIS-2020 reported an HIV-negative or unknown serostatus, were PrEP-eligible, and resided in nonurban ZIP codes in the contiguous U.S. (see **Table 5**). Of all MSM, 20.1% resided in a PrEP desert, and 15.2% of MSM used PrEP in the past 12 months. Nearly half were aged 15-24 years, and about a third earned $75,000 or more in annual household income. Approximately one-third of MSM represented racial/ethnic minority groups, including 9.6% non-Hispanic Black, 18.0% Hispanic, and 6.9% other or multiple races. Most MSM completed at least some college education and had private health insurance coverage. Nearly one in four (23.9%) MSM reported experiencing anticipated healthcare stigma, and 8.7% reported experiencing enacted healthcare stigma. Four in ten (43.7%) MSM resided in a ZIP code located in the South, and one in three (33.4%) MSM resided in a ZIP code in a suburban area.

In the unadjusted regression model, area-level drive-time accessibility of PrEP-providing clinics was associated with individual-level PrEP use in the past 12 months among PrEP-eligible AMIS-2020 MSM participants in nonurban areas (see **Table 6**). Compared with MSM who did not reside in PrEP deserts, MSM residing in PrEP deserts were less likely to use PrEP in the past 12 months (PR = 0.62; 95% CI = 0.51, 0.77). In adjusted models, this negative association between area-level PrEP accessibility and individual-level PrEP use in the past 12 months remained (see **Table 7**). After adjusting for age, race/ethnicity, educational attainment, annual household income, health insurance coverage, and experiences of anticipated and enacted healthcare stigma, MSM residing in PrEP deserts were less likely to report PrEP use in the past 12 months (aPR = 0.66; 95% CI = 0.53, 0.82) compared with those who did not reside in PrEP deserts. After additionally adjusting for U.S. Census region and nonurban ZIP code type, MSM who resided in PrEP deserts were less likely to use PrEP in the past year compared with MSM not residing in PrEP deserts (aPR = 0.70; 95% CI = 0.56, 0.87).

We determined whether the type of nonurban ZIP code where MSM resided modified the association between area-level PrEP accessibility and individual-level PrEP use (see **Table 7**). Suburban MSM residing in PrEP deserts were less likely to use PrEP in the past 12 months (aPR = 0.35; 95% CI = 0.15, 0.80) compared with those not residing in PrEP deserts. Other nonurban MSM residing in PrEP deserts were also less likely to have used PrEP in the past year than those not residing in PrEP deserts (aPR = 0.75; 95% CI = 0.60, 0.95). Generally, similar associations between area-level PrEP accessibility and individual-level PrEP use in the past year were reported when including all AMIS-2020 participants with an HIV-negative or unknown serostatus who resided in nonurban ZIP codes regardless of PrEP eligibility status (see **Table 8**, **Table 9**, and **Table 10**).

Discussion

With the HIV epidemic growing in rural and suburban communities across the U.S., increasing the use of effective HIV prevention strategies, such as PrEP, is key for reducing new HIV infections

among populations disproportionately affected by HIV, such as MSM, in these areas. Determining the structural barriers to improving and expanding PrEP use among MSM populations can help inform interventions, policies, and other efforts that are developed and implemented to support the U.S. EHE Initiative in nonurban areas.[1,8,84] Thus, we sought to quantify the relationship between area-level geographic accessibility of PrEP-providing clinics and individual-level PrEP use among nonurban MSM. In this novel multilevel epidemiologic study using a large, online database, we found that residing in a PrEP desert (more than 30 minutes one-way drive time from the nearest PrEP-providing clinic) was negatively associated with the usage of PrEP in the past year among MSM in nonurban areas.

Specifically, we found that, overall, MSM who resided in PrEP deserts were 30% less likely to use PrEP in the past 12 months compared with those not residing in PrEP deserts when adjusting for demographic, socioeconomic, and geographic characteristics. These findings reflect the disparities in PrEP accessibility among populations in nonurban areas in the U.S. For instance, we previously reported that 94% of nearly 109,000 PrEP-eligible MSM who lived in PrEP deserts resided in nonurban communities, including an estimated 25,127 PrEP-eligible MSM residing in suburban communities and 77,005 PrEP-eligible MSM residing in other nonurban communities.[73] Research has also found that the density of PrEP-providing clinics per new HIV diagnoses was lowest among suburban and rural areas compared with urban areas.[74] Our study's findings also reflect research that has highlighted disparities in the uptake of PrEP among nonurban populations. One study reported that urban areas had higher PrEP use than nonurban areas, but this phenomenon was indicative of higher HIV burden and, thus, need in urban areas.[54] We previously found that PrEP-eligible MSM in nonurban areas reported less PrEP use than those in urban areas between 2013-2017, with PrEP-eligible MSM residing in suburban areas, small/medium metropolitan areas, and rural areas being 38%, 42%, and 55% less likely than PrEP-eligible MSM in urban areas to use PrEP, respectively.[101] We also found similar findings of PrEP-eligible MSM residing in suburban and rural areas consistently reporting lower levels of ever using PrEP than those in urban areas.[100] Ultimately, our study's results reflect findings from existing literature, but we also build upon such literature by demonstrating that drive time to a PrEP-providing clinic affects PrEP use

regardless of nonurban dichotomies (suburban, other nonurban, rural, etc.). Future work may be needed to further investigate the determinants of the disparities in the relationship between PrEP access and PrEP usage in suburban and rural areas, especially considering the importance of expanding access to and use of PrEP among disproportionately affected populations in nonurban areas as in accordance with the U.S. EHE Initiative.

Our study identified heterogeneity in the association between residing in a PrEP desert and using PrEP in the past 12 months when considering the type of nonurban ZIP code where MSM resided. Particularly, suburban MSM residing in PrEP deserts were 65% less likely to use PrEP in the past year compared with suburban MSM not residing in PrEP deserts, and other nonurban MSM residing in PrEP deserts were 25% less likely to use PrEP in the past year than other nonurban MSM not residing in PrEP deserts. The finding of a more extreme association between residing in a PrEP desert and recent use of PrEP among MSM living in suburban ZIP codes as opposed to in other types of nonurban ZIP codes reflects the challenging barriers to healthcare access that are unique to suburban communities in the U.S. One barrier is that suburban communities are disproportionately affected by PrEP deserts. Suburban areas have more estimated PrEP-eligible MSM residing more than 30 minutes from a PrEP-providing clinic than any other urbanicity type.[73] Relatedly, another barrier is the suboptimal distribution of PrEP-providing clinics in relation to populations in need in suburban communities. We have reported that suburban areas have fewer PrEP-providing clinics per PrEP-eligible MSM (1.9 clinics per 1000 MSM) than any other urbanicity type, including rural areas (2.5 clinics per 1000 MSM).[74] Lastly, over time, persons in suburban areas have been increasingly affected by rising levels of poverty and other socioeconomic inequities that have made accessing healthcare services in these areas challenging.[131] Considering these barriers, suburban communities in the U.S. may need targeted interventions to establish more PrEP-providing clinics, including clinics with financial navigation services and services for uninsured populations, to serve MSM at high risk for HIV infection residing in such communities.

Reducing the spread of the HIV epidemic in nonurban communities in the U.S. necessitates expanding both the accessibility of PrEP and usage of PrEP, especially in disproportionately affected

MSM communities. Accordingly, the U.S. EHE Initiative established one of its four major strategies for reducing the U.S. HIV epidemic to "prevent new HIV transmission by using proven interventions, including pre-exposure prophylaxis…," focusing on enhancing HIV prevention efforts and improving PrEP access and uptake in states with a disproportionate number of new HIV cases in nonurban areas.[1,8] To achieve the prevention strategy of the EHE Initiative, our findings suggest there could be a benefit to decreasing transportation barriers to PrEP access, and this could be accomplished in a number of ways. This may require improved spatial allocation of PrEP-providing clinics and more PrEP providers that are available to serve disproportionately affected populations in suburban and rural communities across the U.S. Achieving increased PrEP access and uptake may also require partnerships between state and local health departments and various healthcare providers in diverse settings. Currently, the Centers for Disease Control and Prevention funds state and local health departments to address the growing HIV epidemic in suburban and rural communities; however, there may be opportunities to innovate PrEP healthcare delivery by decentralizing the current PrEP delivery model from traditional clinical settings and partnering with other healthcare providers, such as pharmacists and nurses, to overcome present barriers to PrEP uptake and contribute to PrEP usage expansion efforts.[64,65,132-138] The EHE Initiative's prevention strategy may also be attained by incorporating alternative PrEP delivery models, primarily telehealth-based or home-based PrEP programs, in nonurban areas. The use of telemedicine, mobile phone applications, and home-based PrEP service delivery models may better contribute to the increase of PrEP use among MSM populations in rural and suburban areas by providing convenient, confidential, and safe spaces for PrEP healthcare provision where anti-HIV, anti-MSM, and PrEP stigma can be minimized.[60,64,65,132,139-146] Interventions designed to decrease barriers to PrEP access, such as establishing additional PrEP-providing clinics in diverse settings and innovative home-based and technology-based PrEP service provision programs, are needed to address the growing HIV epidemic in nonurban U.S. communities, and such interventions should be affordable, accommodating and acceptable to clients, and culturally competent to reduce HIV transmissions in disproportionately affected MSM populations.[76,77,79,119,147,148]

There are several limitations of our study. First, the AMIS-2020 participants included in our study may not be representative of the MSM population in the U.S. because AMIS-2020 was overrepresented by MSM who were non-Hispanic White, were highly educated, and reported high annual household incomes. While the sociodemographic distribution of the AMIS-2020 participants is generally comparable to U.S. adults, it does not fully reflect MSM in the U.S. with disproportionate risk for HIV infection, particularly with regards to race/ethnicity and socioeconomic status.[4] Because of this, our findings may be conservative since we do not necessarily capture MSM who may be more affected by social vulnerabilities and who may be more likely to reside in PrEP deserts and less likely to use PrEP. Also, AMIS-2020 participants were recruited using convenience sampling. This may have led to the enrollment of MSM who may have been more interested in sexual health concerns significant to MSM communities. While the AMIS-2020 dataset likely suffers from some level of selection bias, the nature of the sampling used in AMIS prevents the determination of the direction or magnitude of the effect of selection bias. Moreover, there is no unbiased sampling method for this disproportionately affected population.

Second, we defined our exposure variable (drive-time accessibility of PrEP-providing clinics, or whether a participant's ZIP code of residence was a PrEP desert) using a 30-minute threshold. Longer thresholds (e.g., 60-minute or 120-minute PrEP deserts) may be appropriate for nonurban areas where expectations for drive-time to healthcare services are likely greater; however, the 30-minute threshold has historically been and continues to be considered the standard for accessing non-emergency and primary healthcare services, including PrEP-providing clinics.[73,149,150] Also, studies using focus group methodology found that MSM in nonurban areas reported drive times of at least 30 minutes to access PrEP providers, justifying the use of a 30-minute PrEP desert threshold in our novel study on the effect of area-level PrEP accessibility on individual-level PrEP use.[117,119] Additional studies should replicate our study using other drive-time thresholds or, even, determine the most optimal threshold by computing one-way drive times to the nearest PrEP-providing clinic continuously (in minutes) to redefine the most appropriate drive-time threshold for a specified area of interest.

Third, we constructed our exposure variable at the ZIP code level; however, ZIP codes are not an optimal geographic unit for geospatial analysis because they are representations of U.S. mail delivery routes, not established geographic boundaries.[151,152] Additionally, ZIP codes are added, discontinued, and altered by the U.S. Postal Service with high frequency.[151,152] To account for these limitations, we used the most recent database of ZIP code geographic boundaries that was available at the time of our study. Fourth and furthermore, the geometric centroids of participants' ZIP codes, not actual residential addresses, were used to model geographic access to PrEP-providing clinics. However, ZIP codes are relatively accurate representations of communities and may be useful for community-level interventions, despite not having residential addresses of AMIS-2020 participants. Moreover, because ZIP codes were classified based on the nonurban designation of the county in which they were located, some ZIP codes may have been misclassified because many large counties contain both suburban and more rural ZIP codes, but we were not able to assign nonurban designations at a sub-county level.

Finally, the AMIS-2020 data were collected during the coronavirus disease 2019 (COVID-19) pandemic; thus, the findings reported in our study may be transitory. However, while recent studies have reported some interruptions to the accessibility and use of PrEP due to COVID-19, MSM in the U.S. have largely been able to continue receiving prescriptions for PrEP and accessing their PrEP medications during the pandemic.[153-156] These studies were conducted during the early phases of the COVID-19 pandemic; therefore, the level of disruption the pandemic had on the accessibility of PrEP healthcare infrastructure and, thus, the availability of PrEP may have fluctuated by varying degrees over time. Future studies should continue to evaluate the relationship between area-level PrEP accessibility and individual-level PrEP use under non-pandemic conditions.

Conclusions

Scaling up PrEP, an antiretroviral medication effective for preventing HIV transmission, can help address the growing HIV epidemic among MSM in nonurban areas. Our findings suggest that, overall,

MSM who resided in PrEP deserts were 30% less likely to use PrEP in the previous 12 months compared with those not residing in PrEP deserts. We also found that suburban MSM residing in PrEP deserts were 65% less likely to use PrEP in the past year than suburban MSM not residing in PrEP deserts, and other nonurban MSM residing in PrEP deserts were 25% less likely to use PrEP in the past year than other nonurban MSM not residing in PrEP deserts. Interventions designed to decrease barriers to PrEP access that are unique to nonurban areas in the U.S. are needed to address the growing HIV epidemic in these communities.

Table 5. Characteristics of PrEP-eligible nonurban MSM participants in the American Men's Internet Survey 2020 cycle, overall and by status of PrEP use in the past 12 months – United States.

Characteristics	**Overall Study Population** N (%)	**Recent PrEP Use**[b] N (%)	**No Recent PrEP Use**[b] N (%)
Total	4,792 (100%)	726 (15.2%)	4,066 (84.9%)
PrEP desert status			
Not residing in a PrEP desert[a]	3,827 (79.9%)	627 (16.4%)	3,200 (83.6%)
Residing in a PrEP desert[a]	965 (20.1%)	99 (10.3%)	866 (89.7%)
Age (years)			
15-24	2,349 (49.0%)	236 (10.1%)	2,113 (90.0%)
25-29	1,147 (23.9%)	225 (19.6%)	922 (80.4%)
30-39	404 (8.4%)	116 (28.7%)	288 (71.3%)
40 and older	892 (18.6%)	149 (16.7%)	743 (83.3%)
Race/ethnicity			
Non-Hispanic White	3,084 (65.5%)	468 (15.2%)	2,616 (84.8%)
Non-Hispanic Black	450 (9.6%)	67 (14.9%)	383 (85.1%)
Hispanic	848 (18.0%)	132 (15.6%)	716 (84.4%)
Other or multiple races	326 (6.9%)	50 (15.3%)	276 (84.7%)
Educational attainment			
High school or less	1,202 (25.1%)	97 (8.1%)	1,105 (91.9%)
At least some college	3,590 (74.9%)	629 (17.5%)	2,961 (82.5%)
Annual household income			
$0 - $19,999	695 (16.3%)	96 (13.8%)	599 (86.2%)
$20,000 - $39,999	1,011 (23.7%)	131 (13.0%)	880 (87.0%)
$40,000 - $74,999	1,118 (26.2%)	208 (18.6%)	910 (81.4%)
$75,000 or more	1,447 (33.9%)	243 (16.8%)	1,204 (83.2%)
Health insurance coverage			
Private only	3,105 (67.7%)	507 (16.3%)	2,598 (83.7%)
Public only	674 (14.7%)	121 (18.0%)	553 (82.1%)
Other/Multiple	256 (5.6%)	37 (14.5%)	219 (85.6%)
None	555 (12.1%)	54 (9.7%)	501 (90.3%)
Anticipated healthcare stigma			
Never	3,648 (76.1%)	558 (15.3%)	3,090 (84.7%)
Ever	1,144 (23.9%)	168 (14.7%)	976 (85.3%)
Enacted healthcare stigma			
Never	4,373 (91.3%)	618 (14.1%)	3,755 (85.9%)
Ever	419 (8.7%)	108 (25.8%)	311 (74.2%)
Region			
Northeast	780 (16.3%)	140 (18.0%)	640 (82.1%)
Midwest	1,115 (23.3%)	146 (13.1%)	969 (86.9%)
South	2,092 (43.7%)	302 (14.4%)	1,790 (85.6%)
West	805 (16.8%)	138 (17.1%)	667 (82.9%)
Nonurban type			
Suburban[c]	1,598 (33.4%)	279 (17.5%)	1,319 (82.5%)
Other nonurban[c]	3,193 (66.7%)	447 (14.0%)	2,746 (86.0%)
Medium metro	1,640 (34.2%)	267 (16.3%)	1,373 (83.7%)
Small metro	721 (15.1%)	102 (14.2%)	619 (85.9%)
Micropolitan	566 (11.8%)	63 (11.1%)	503 (88.9%)

Non-core	266 (5.6%)	15 (5.6%)	251 (94.4%)

Notes: MSM: men who have sex with men; PrEP: pre-exposure prophylaxis

[a]PrEP desert refers to ZIP codes with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.

[b]Recent PrEP use refers to PrEP use in the past 12 months.

[c]Surbuban ZIP codes are located within large fringe metropolitan counties, and other nonurban ZIP codes are located within medium metropolitan, small metropolitan, micropolitan, and non-core counties.

Table 6. Unadjusted associations with PrEP use in the past 12 months among PrEP-eligible nonurban MSM participants in the American Men's Internet Survey 2020 cycle – United States.

Characteristics	Prevalence Ratio (95% CI)
PrEP desert status	
Not residing in a PrEP desert[a]	Referent
Residing in a PrEP desert[a]	**0.62 (0.51-0.77)**
Age (years)	
15-24	Referent
25-29	**1.96 (1.65-2.32)**
30-39	**2.90 (2.39-3.52)**
40 and older	**1.67 (1.38-2.03)**
Race/ethnicity	
Non-Hispanic White	Referent
Non-Hispanic Black	0.98 (0.77-1.25)
Hispanic	1.02 (0.85-1.22)
Other or multiple races	1.01 (0.77-1.32)
Educational attainment	
High school or less	Referent
At least some college	**2.18 (1.78-2.67)**
Annual household income	
$0 - $19,999	0.82 (0.66-1.02)
$20,000-$39,999	**0.77 (0.63-0.94)**
$40,000 - $74,999	1.11 (0.93-1.31)
$75,000 or more	Referent
Health insurance coverage	
Private only	Referent
Public only	1.10 (0.92-1.32)
Other/Multiple	0.88 (0.64-1.21)
None	**0.60 (0.46-0.78)**
Anticipated healthcare stigma	
Never	Referent
Ever	0.96 (0.82-1.13)
Enacted healthcare stigma	
Never	Referent
Ever	**1.83 (1.52-2.19)**
Region	
Northeast	Referent
Midwest	**0.72 (0.58-0.90)**
South	**0.80 (0.67-0.96)**
West	0.96 (0.77-1.18)
Nonurban type	
Suburban[b]	Referent
Other nonurban[b]	**0.80 (0.69-0.92)**

Notes: CI, confidence interval; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis
Bold values indicate statistical significance at $P < 0.05$.
[a]PrEP desert refers to ZIP codes with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.
[b]Surbuban ZIP codes are located within large fringe metropolitan counties, and other nonurban ZIP codes are located within medium metropolitan, small metropolitan, micropolitan, and non-core counties.

Table 7. Adjusted associations with PrEP use in the past 12 months among PrEP-eligible nonurban MSM participants in the American Men's Internet Survey 2020 cycle – United States.

Characteristics	Model 1 aPR (95% CI)	Model 2 aPR (95% CI)	Model 3 aPR (95% CI)
PrEP desert status			
Not residing in a PrEP desert[a]	Referent	Referent	-
Residing in a PrEP desert[a]	**0.66 (0.53-0.82)**	**0.70 (0.56-0.87)**	-
PrEP desert status by Nonurban type			
PrEP desert[a] by Suburban[b]	-	-	**0.35 (0.15-0.80)**
PrEP desert[a] by Other nonurban[b]	-	-	**0.75 (0.60-0.95)**
Age (years)			
15-24	Referent	Referent	Referent
25-29	**1.62 (1.35-1.95)**	**1.62 (1.35-1.95)**	**1.62 (1.35-1.95)**
30-39	**2.32 (1.89-2.86)**	**2.35 (1.91-2.88)**	**2.34 (1.90-2.87)**
40 and older	**1.35 (1.09-1.68)**	**1.36 (1.10-1.68)**	**1.35 (1.09-1.68)**
Race/ethnicity			
Non-Hispanic White	Referent	Referent	Referent
Non-Hispanic Black	1.00 (0.78-1.28)	1.00 (0.78-1.29)	1.00 (0.78-1.29)
Hispanic	1.16 (0.97-1.40)	1.11 (0.92-1.34)	1.10 (0.91-1.33)
Other or multiple races	1.05 (0.80-1.39)	1.04 (0.79-1.37)	1.04 (0.79-1.37)
Educational attainment			
High school or less	Referent	Referent	Referent
At least some college	**1.79 (1.41-2.28)**	**1.81 (1.42-2.30)**	**1.81 (1.42-2.30)**
Annual household income			
$0 - $19,999	1.04 (0.83-1.30)	1.07 (0.86-1.34)	1.07 (0.86-1.34)
$20,000-$39,999	0.87 (0.71-1.06)	0.89 (0.73-1.09)	0.89 (0.73-1.09)
$40,000 - $74,999	1.06 (0.89-1.25)	1.08 (0.92-1.28)	1.09 (0.92-1.28)
$75,000 or more	Referent	Referent	Referent
Health insurance coverage			
Private only	Referent	Referent	Referent
Public only	1.10 (0.90-1.35)	1.10 (0.91-1.34)	1.10 (0.91-1.34)
Other/multiple	0.85 (0.61-1.17)	0.84 (0.61-1.17)	0.84 (0.61-1.17)
None	**0.61 (0.46-0.81)**	**0.62 (0.47-0.81)**	**0.62 (0.47-0.82)**
Anticipated healthcare stigma			
Never	Referent	Referent	Referent
Ever	0.89 (0.75-1.05)	0.90 (0.76-1.06)	0.90 (0.76-1.06)
Enacted healthcare stigma			
Never	Referent	Referent	Referent
Ever	**1.71 (1.42-2.07)**	**1.71 (1.42-2.06)**	**1.70 (1.41-2.05)**
Region			
Northeast	-	Referent	Referent
Midwest	-	0.82 (0.66-1.02)	0.82 (0.66-1.02)
South	-	0.87 (0.72-1.06)	0.88 (0.72-1.06)
West	-	1.07 (0.86-1.34)	1.09 (0.87-1.35)
Nonurban type			
Suburban[b]	-	Referent	-
Other nonurban[b]	-	**0.86 (0.75-0.99)**	-

Notes: aPR, adjusted prevalence ratio; CI, confidence interval; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis

Bold values indicate statistical significance at $P < 0.05$.
[a]PrEP desert refers to ZIP codes with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.
[b]Surbuban ZIP codes are located within large fringe metropolitan counties, and other nonurban ZIP codes are located within medium metropolitan, small metropolitan, micropolitan, and non-core counties.

Table 8. Characteristics of PrEP-eligible and PrEP-ineligible nonurban MSM participants in the American Men's Internet Survey 2020 cycle, overall and by status of PrEP use in the past 12 months – United States.

Characteristics	**Overall Study Population** N (%)	**Recent PrEP Use**[b] N (%)	**No Recent PrEP Use**[b] N (%)
Total	7,558 (100%)	846 (11.2%)	6,712 (88.8%)
PrEP desert status			
Not residing in a PrEP desert[a]	6,084 (80.5%)	735 (12.1%)	5,349 (87.9%)
Residing in a PrEP desert[a]	1,474 (19.5%)	111 (7.5%)	1,363 (92.5%)
Age (years)			
15-24	3,546 (46.9%)	288 (8.1%)	3,258 (91.9%)
25-29	1,719 (22.7%)	255 (14.8%)	1,464 (85.2%)
30-39	681 (9.0%)	130 (19.1%)	551 (80.9%)
40 and older	1,612 (21.3%)	173 (10.7%)	1,439 (89.3%)
Race/ethnicity			
Non-Hispanic White	4,945 (66.7%)	555 (11.2%)	4,390 (88.8%)
Non-Hispanic Black	672 (9.1%)	75 (11.2%)	597 (88.8%)
Hispanic	1,292 (17.4%)	149 (11.5%)	1,143 (88.5%)
Other or multiple races	507 (6.8%)	58 (11.4%)	449 (88.6%)
Educational attainment			
High school or less	1,783 (23.6%)	113 (6.3%)	1,670 (93.7%)
At least some college	5,775 (76.4%)	733 (12.7%)	5,042 (87.3%)
Annual household income			
$0 - $19,999	1,035 (15.3%)	113 (10.9%)	922 (89.1%)
$20,000-$39,999	1,544 (22.8%)	156 (10.1%)	1,388 (89.9%)
$40,000 - $74,999	1,715 (25.4%)	236 (13.8%)	1,479 (86.2%)
$75,000 or more	2,471 (36.5%)	283 (11.5%)	2,188 (88.6%)
Health insurance coverage			
Private only	4,950 (68.1%)	589 (11.9%)	4,361 (88.1%)
Public only	1,096 (15.1%)	137 (12.5%)	959 (87.5%)
Other/multiple	438 (6.0%)	43 (9.8%)	395 (90.2%)
None	781 (10.8%)	69 (8.8%)	712 (91.2%)
Anticipated healthcare stigma			
Never	5,854 (77.5%)	651 (11.1%)	5,203 (88.9%)
Ever	1,704 (22.6%)	195 (11.4%)	1,509 (88.6%)
Enacted healthcare stigma			
Never	6,940 (91.8%)	723 (10.4%)	6,217 (89.6%)
Ever	618 (8.2%)	123 (19.9%)	495 (80.1%)
Region			
Northeast	1,310 (17.3%)	163 (12.4%)	1,147 (87.6%)
Midwest	1,716 (22.7%)	171 (10.0%)	1,545 (90.0%)
South	3,256 (43.1%)	356 (10.9%)	2,900 (89.1%)
West	1,276 (16.9%)	156 (12.2%)	1,120 (87.8%)
Nonurban type			
Suburban[c]	2,559 (33.9%)	319 (12.5%)	2,240 (87.5%)
Other nonurban[c]	4,998 (66.1%)	527 (10.5%)	4,471 (89.5%)
Medium metro	2,613 (34.6%)	310 (11.9%)	2,303 (88.1%)
Small metro	1,142 (15.1%)	121 (10.6%)	1,021 (89.4%)

Micropolitan	842 (11.1%)	78 (9.3%)	764 (90.7%)
Non-core	401 (5.3%)	18 (4.5%)	383 (95.5%)

Notes: MSM: men who have sex with men; PrEP: pre-exposure prophylaxis

[a]PrEP desert refers to ZIP codes with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.

[b]Recent PrEP use refers to PrEP use in the past 12 months.

[c]Surbuban ZIP codes are located within large fringe metropolitan counties, and other nonurban ZIP codes are located within medium metropolitan, small metropolitan, micropolitan, and non-core counties.

Table 9. Unadjusted associations with PrEP use in the past 12 months among PrEP-eligible and PrEP-ineligible nonurban MSM participants in the American Men's Internet Survey 2020 cycle – United States.

Characteristics	Prevalence Ratio (95% CI)
PrEP desert status	
Not residing in a PrEP desert[a]	Referent
Residing in a PrEP desert[a]	**0.62 (0.51-0.76)**
Age (years)	
15-24	Referent
25-29	**1.83 (1.56-2.15)**
30-39	**2.36 (1.95-2.85)**
40 and older	**1.32 (1.10-1.59)**
Race/ethnicity	
Non-Hispanic White	Referent
Non-Hispanic Black	1.00 (0.79-1.26)
Hispanic	1.03 (0.86-1.22)
Other or multiple races	1.02 (0.79-1.32)
Educational attainment	
High school or less	Referent
At least some college	**2.00 (1.66-2.42)**
Annual household income	
$0 - $19,999	0.95 (0.78-1.17)
$20,000-$39,999	0.88 (0.73-1.07)
$40,000 - $74,999	**1.20 (1.02-1.41)**
$75,000 or more	Referent
Health insurance coverage	
Private only	Referent
Public only	1.05 (0.89-1.25)
Other/multiple	0.82 (0.61-1.11)
None	**0.74 (0.58-0.95)**
Anticipated healthcare stigma	
Never	Referent
Ever	1.03 (0.88-1.20)
Enacted healthcare stigma	
Never	Referent
Ever	**1.91 (1.61-2.27)**
Region	
Northeast	Referent
Midwest	**0.80 (0.65-0.98)**
South	0.88 (0.74-1.04)
West	0.98 (0.80-1.20)
Nonurban type	
Suburban[b]	Referent
Other nonurban[b]	**0.85 (0.74-0.96)**

Notes: CI, confidence interval; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis. Bold values indicate statistical significance at $P < 0.05$.

[a]PrEP desert refers to ZIP codes with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.

[b]Surbuban ZIP codes are located within large fringe metropolitan counties, and other nonurban ZIP codes are located within medium metropolitan, small metropolitan, micropolitan, and non-core counties.

Table 10. Adjusted associations with PrEP use in the past 12 months among PrEP-eligible and PrEP-ineligible nonurban MSM participants in the American Men's Internet Survey 2020 cycle – United States.

Characteristics	Model 1 aPR (95% CI)	Model 2 aPR (95% CI)	Model 3 aPR (95% CI)
PrEP desert status			
Not residing in a PrEP desert[a]	Referent	Referent	-
Residing in a desert[a]	**0.64 (0.52-0.78)**	**0.66 (0.54-0.81)**	-
PrEP desert status by Nonurban type			
PrEP desert[a] by Suburban	-	-	**0.39 (0.19-0.80)**
PrEP desert[a] by Other nonurban	-	-	**0.70 (0.56-0.87)**
Age (years)			
15-24	Referent	Referent	Referent
25-29	**1.53 (1.29-1.82)**	**1.53 (1.29-1.82)**	**1.53 (1.28-1.82)**
30-39	**1.97 (1.61-2.41)**	**1.98 (1.62-2.42)**	**1.98 (1.62-2.42)**
40 and older	1.09 (0.89-1.34)	1.09 (0.89-1.34)	1.09 (0.88-1.34)
Race/ethnicity			
Non-Hispanic White	Referent	Referent	Referent
Non-Hispanic Black	1.02 (0.81-1.30)	1.03 (0.81-1.32)	1.03 (0.81-1.32)
Hispanic	1.11 (0.93-1.33)	1.07 (0.89-1.30)	1.07 (0.89-1.29)
Other or multiple races	1.01 (0.78-1.32)	1.00 (0.77-1.30)	1.00 (0.77-1.30)
Educational attainment			
High school or less	Referent	Referent	Referent
At least some college	**1.80 (1.44-2.25)**	**1.81 (1.44-2.27)**	**1.81 (1.44-2.27)**
Annual household income			
$0 - $19,999	1.16 (0.95-1.43)	1.19 (0.96-1.47)	1.19 (0.96-1.46)
$20,000-$39,999	0.95 (0.79-1.15)	0.97 (0.80-1.17)	0.97 (0.80-1.18)
$40,000 - $74,999	1.16 (0.98-1.36)	**1.18 (1.00-1.38)**	**1.18 (1.00-1.38)**
$75,000 or more	Referent	Referent	Referent
Health insurance coverage			
Private only	Referent	Referent	Referent
Public only	1.12 (0.92-1.36)	1.12 (0.92-1.36)	1.12 (0.92-1.36)
Other/multiple	0.83 (0.61-1.14)	0.83 (0.61-1.14)	0.83 (0.61-1.14)
None	**0.76 (0.59-0.98)**	**0.77 (0.60-0.99)**	**0.77 (0.60-1.00)**
Anticipated healthcare stigma			
Never	Referent	Referent	Referent
Ever	0.92 (0.78-1.08)	0.93 (0.79-1.09)	0.93 (0.79-1.09)
Enacted healthcare stigma			
Never	Referent	Referent	Referent
Ever	**1.81 (1.50-2.18)**	**1.81 (1.51-2.18)**	**1.81 (1.51-2.18)**
Region			
Northeast	-	Referent	Referent
Midwest	-	0.88 (0.72-1.09)	0.89 (0.72-1.09)
South	-	0.92 (0.76-1.10)	0.92 (0.76-1.10)
West	-	1.07 (0.86-1.32)	1.07 (0.86-1.33)
Nonurban type			
Suburban[b]	-	Referent	-
Other nonurban[b]	-	0.91 (0.79-1.04)	-

Notes: aPR, adjusted prevalence ratio; CI, confidence interval; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis

Bold values indicate statistical significance at $P < 0.05$.
[a]PrEP desert refers to ZIP codes with a one-way drive time of more than 30 minutes to the nearest PrEP-providing clinic.
[b]Surbuban ZIP codes are located within large fringe metropolitan counties, and other nonurban ZIP codes are located within medium metropolitan, small metropolitan, micropolitan, and non-core counties.

Chapter 4. Effects of mode of transportation on pre-exposure prophylaxis persistence among urban men who have sex with men during the COVID-19 pandemic

Abstract

The geographic accessibility of pre-exposure prophylaxis (PrEP) care can be a barrier to PrEP persistence. However, the influence of travel-related barriers, such as mode of transportation, on PrEP persistence is not well understood. We used data from the 2020 American Men's Internet Survey and conducted multilevel logistic regression to estimate the association between modes of transportation used for healthcare access and PrEP persistence among urban men who have sex with men (MSM) in the U.S. during the COVID-19 pandemic. Of 800 urban MSM, 60.6% used private transportation to access healthcare services, and 77.4% of MSM who reported PrEP use in the past year were persistently using PrEP. In adjusted analyses, MSM using public transportation had lower odds of PrEP persistence (adjusted odds ratio (aOR): 0.48; 95% confidence interval (CI): 0.24-0.95) than MSM using private transportation. There were no significant associations between persistent PrEP use and using active transportation (aOR: 0.62; 95% CI: 0.31-1.25) or multimodal transportation (aOR: 0.86; 95% CI: 0.55-1.34) compared to using private transportation. Transportation-related structural interventions are needed to improve the accessibility of PrEP services and PrEP persistence in urban areas.

Introduction

The U.S. HIV epidemic was concentrated among men who have sex with men (MSM) residing in urban areas when it was first identified in the early 1980s,[21] and it has remained an epidemic disproportionately affecting MSM in these areas.[24,157] In 2016, U.S. metropolitan areas with populations of 500,000+ had an HIV prevalence that was twice and three times that of suburban and rural areas, respectively.[24] U.S. cities are also centers of new HIV infections, with HIV diagnosis rates being 1.6 and 2.8 times that of suburban and rural areas in 2017, respectively.[24]

Pre-exposure prophylaxis (PrEP) with oral emtricitabine and tenofovir disoproxil fumarate (FTC-TDF) or tenofovir alafenamide with emtricitabine (TAF–FTC) taken as a once-daily tablet is an effective biomedical intervention for preventing HIV infections.[34,35,40-43,49,50] PrEP can assist with lessening the HIV epidemic in urban areas by preventing HIV transmission in high-risk, HIV-negative individuals by up to 99% when taken as prescribed.[34,35,40-43,49,50] PrEP has also been shown to reduce annual HIV diagnosis rates by 1.3% at the state level.[51] Widespread PrEP use among populations in urban localities who are at risk for HIV infection can better control the HIV epidemic in these areas.

Not only is PrEP uptake important for preventing HIV transmission, retention in recommended PrEP care over time, also known as PrEP persistence, among key populations is crucial for controlling the HIV epidemic as well.[158] Research suggests the importance of both PrEP initiation and persistence in averting HIV infections.[159] However, PrEP uptake in the U.S. is low in relation to persons with PrEP indications,[4,94] and PrEP persistence has been reported at even lower levels.[160] Additionally, the COVID-19 pandemic has impacted the utilization of various healthcare services,[161] including PrEP care services to some degree.[153,154,156,162]

Although PrEP clinics are largely located in urban areas,[73,74] the accessibility of PrEP services, and, thusly, PrEP uptake and persistence in these areas can be negatively affected by transportation accessibility.[81] Transportation accessibility uniquely affects urban localities because the presence of different modes of transportation and complex, intersecting transportation systems can complicate

healthcare access. While the effect of transportation mode on persistent PrEP use is not understood, mode of transportation can influence linkage to and retention in HIV care.[68-70,81,82,90,163] While people with HIV in urban areas characteristically access HIV services using multiple transportation modes, public transportation in urban areas can be inflexible and unreliable compared to private transportation.[82] For instance, commute times to HIV care using public transit can be at least three times greater than using private transportation.[68,163] Using private transportation as opposed to public transit is associated with fewer barriers to HIV care access and increased linkage to care,[81] appointment attendance,[68,82,90] and antiretroviral adherence and viral suppression.[81,82]

While research has established that HIV care outcomes can be complicated by using different transportation modes, there is a gap in existing research regarding the extent to which various modes of transportation differentially affect PrEP care outcomes,[73] such as PrEP persistence, among high-risk, HIV-burdened populations, especially during disruptive events such as the COVID-19 pandemic. Therefore, the objective of our study was to estimate the association between modes of transportation used to access health care and persistent PrEP use among MSM in urban areas during the COVID-19 pandemic. Determining how various modes of transportation can be facilitators and/or barriers to PrEP persistence can be beneficial for informing structural interventions to improve the accessibility of PrEP services and persistent use of PrEP among key populations in urban areas.

Methods

Study Population

The American Men's Internet Survey (AMIS) is a cross-sectional online behavioral survey that collects data on HIV risk behaviors and the utilization of HIV-related healthcare services among MSM in the U.S. annually.[124-129] Each AMIS cycle aims to collect data from at least 10,000 MSM across the U.S., who are recruited using convenience sampling methods via advertisements on MSM-frequented websites and social media applications or via mass emails to members of MSM-frequented websites. Participants

from previous AMIS cycles who consented to being contacted for future research studies were also recruited via email. Participants were eligible for AMIS if they were cisgender male, were 15 years of age or older, lived in a valid U.S. ZIP code, and were gay or bisexual or reported ever having oral or anal sex with a man. Participants who were eligible and consented to the AMIS study were immediately directed to the online questionnaire. All AMIS data were stored using a secure server administered by Alchemer (Boulder, Colorado, U.S.). The Emory University Institutional Review Board reviewed and approved the AMIS study.

For our study, we included MSM who participated in the 2020 cycle of AMIS (AMIS-2020), which was conducted between October 2020 and January 2021 during the COVID-19 pandemic. We restricted to participants who were HIV-negative or reported an unknown serostatus, resided in a ZIP code located in the 50 U.S. states and Washington D.C., and resided in an urban ZIP code, which was defined as a ZIP code located in a large central metropolitan county in accordance with previous research.[100,101] We also restricted to participants who reported attending an in-person visit with a healthcare provider in the past 12 months as well as participants who reported PrEP use in the past 12 months.

Measures

Our explanatory variable was mode of transportation used to access health care. In AMIS-2020, participants were asked the following: "In the past 12 months, how did you normally get to a doctor, nurse, or other healthcare provider to receive healthcare services?" Participants could check all that applied based on the following options: "I drove," "I had a friend or family member drive me," "I rode the subway/train/bus," "I took a taxi, Uber, or Lyft," "I rode a bicycle," "I walked," or "Other." Transportation mode was categorized as private transportation if "I drove" or "I had a friend or family member drive me" was selected, as public transportation if "I rode the subway/train/bus" or "I took a taxi, Uber, or Lyft" was selected, as active transportation if "I rode a bicycle" or "I walked" was selected, and as multimodal transportation if more than one response option was selected.

Our outcome of interest was persistent PrEP use. In AMIS-2020, participants who reported PrEP use in the past 12 months were asked the following: "Are you currently taking PrEP?" Participants could respond with the following options: "No," "Yes," "I prefer not to answer," or "Don't know." Persistent PrEP use was dichotomized by whether participants who reported PrEP use in the past year responded "Yes" or "No" to currently using PrEP.

AMIS-2020 study participants reported data on covariates, including age, race/ethnicity, educational attainment, annual household income, health insurance coverage, and healthcare stigma. Age was categorized as 15-24 years, 25-29 years, 30-39 years, and 40 years and older. Race/ethnicity was categorized as non-Hispanic White, non-Hispanic Black, Hispanic, and other/multiple races. Educational attainment was dichotomized as having a college degree/postgraduate education or having less than a college degree. Annual household income was categorized as $0-$19,999, $20,000-$39,999, $40,000-$74,999, and $75,000 or more. Health insurance coverage was categorized as private health insurance only, public health insurance only, other/multiple forms of health insurance, or no form of health insurance. Participants reported anticipated healthcare stigma, which was measured by asking participants if they felt afraid to go to or avoided healthcare services because of fear someone may learn they had sex with men.[130] Anticipated healthcare stigma was dichotomized as ever or never experiencing this type of stigma.

We also used AMIS-2020 data to measure PrEP eligibility and U.S. Census region of residence as covariates. Participants' PrEP eligibility status was determined using an algorithm based on clinical guidelines developed by the Centers for Disease Control and Prevention. Using this algorithm, PrEP eligibility was determined based on whether participants met either of the following criteria: (1) had a main male sexual partner with HIV or (2) had two or more male sexual partners in the past 12 months AND either any condomless anal sex with a man in the past 12 months or a diagnosis of any sexually transmitted infection (i.e., gonorrhea, chlamydia, and syphilis) in the past 12 months.[48,101] Participants reported state of residence, from which region of residence was defined based on U.S. Census Bureau designations (Northeast, Midwest, South, and West). Covariates were included in this study based on

previously reported or hypothesized associations with PrEP persistence or transportation to HIV-related care.[68,81,162,164-169]

Statistical Analyses

We computed descriptive statistics for mode of transportation used to access health care and the covariates of interest by persistent PrEP use. We visualized descriptive statistics for persistent PrEP use and the covariates by transportation mode in balloon plots. Using a sequential modeling approach, we conducted a series of multilevel logistic generalized estimating equations to examine the association between modes of transportation and persistent PrEP use. Model 1 was unadjusted, and Model 2 adjusted for demographic and socioeconomic factors. Model 3 additionally adjusted for PrEP eligibility status, and Model 4 additionally adjusted for U.S. Census region. Multivariable regression analyses stratified by region were also considered but were not feasible due to sample size constraints. We computed odds ratios (OR) with 95% confidence intervals (CIs) from the unadjusted regression models and adjusted odds ratios (aOR) with 95% CIs from the multivariable regression models. All statistical analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC), and visualizations were produced using R 4.1.1 "ggballoonplot" package (R Foundation for Statistical Computing, Vienna, Austria).

Results

Overall, 800 MSM participating in AMIS-2020 were HIV-negative or reported an unknown serostatus, resided in an urban ZIP code, attended an in-person visit with a healthcare provider in the past year, and reported PrEP use in the past year (see **Table 11**). Six in ten MSM used private transportation to access healthcare services, and 77% of MSM who reported PrEP use in the past year were persistently using PrEP at the time of AMIS-2020. Approximately six in ten MSM were under the age of 30 years. Nearly 45% of MSM were racial/ethnic minority persons and earned $75,000 or more annually. Most MSM had private health insurance, had a college or postgraduate education, and were PrEP eligible.

Nearly one in four MSM reported anticipated healthcare stigma, and approximately one in three MSM lived in the South. There were differences in persistent PrEP use by age and PrEP eligibility status.

MSM using different modes of transportation to access health care differed by age, race/ethnicity, health insurance coverage, and region (see **Figure 12**). MSM who were older used private transportation more than younger MSM (40+ years: 70.2%; 15-24 years: 57.4%). Non-Hispanic Black MSM used public transportation more (15.7%) than non-Hispanic White MSM (6.6%) in urban areas. MSM residing in the Northeast used private transportation less (28.2%) than MSM in other regions (Midwest: 59.7%; West: 70.6%; South: 74.2%) but used public transportation more (27.1%) than MSM in other regions (Midwest: 6.0%; West: 3.7%; South: 2.2%).

In unadjusted analyses, there were no significant associations between any of the modes of transportation used to access healthcare services and persistent PrEP use (see **Table 12**). However, after adjusting for age, race/ethnicity, educational attainment, annual household income, health insurance coverage, anticipated healthcare stigma, PrEP eligibility status, and region in the final model, MSM using public transportation had lower odds of persistent PrEP use than MSM using private transportation (aOR: 0.48; 95% CI: 0.24-0.95). After adjustment, no significant associations remained between persistent PrEP use among MSM using active transportation (aOR: 0.62; 95% CI: 0.31-1.25) or multimodal transportation (aOR: 0.86; 95% CI: 0.55-1.34) compared to MSM using private transportation.

Discussion

PrEP persistence is critical for addressing the U.S. HIV epidemic, including in urban areas; however, the mode of transportation a person uses to access care may complicate access to PrEP care services and persistent PrEP use. Our multilevel cross-sectional study of 800 MSM in urban areas examined the influence of modes of transportation used to access health care on PrEP persistence during the COVID-19 pandemic. To our knowledge, our study is the first to investigate the relationship between PrEP persistence and modes of transportation used to access healthcare services. In our study, we

identified that MSM using public transportation to access health care had 0.48 times lower odds of PrEP persistence than MSM using private transportation. This reflects prior research finding that public transportation was associated with 10-25% less HIV care retention among MSM in a metropolitan area as well as longer commute times to an HIV care provider.[68-70] Other research further supports the importance of using private transportation to access HIV-related services as opposed to using public transit.[81,82,90,163] Our study suggests that the use of public transportation may similarly be a barrier to retention in PrEP care for key populations, including MSM.

Although not significant, MSM using active transportation to access health care had 0.62 times lower odds of PrEP persistence than MSM using private transportation, which reflects recent research finding that fewer HIV prevention services in a major U.S. city were accessible by walking compared to driving.[170] This could signify that biking and walking to access a healthcare provider may be barriers to retention in PrEP care. In addition, though not significant, MSM using multimodal transportation to access health care had 0.86 times lower odds of PrEP persistence than MSM using private transportation, suggesting that the transit-related barriers involved with utilizing multiple modes of transportation to attend a healthcare visit may also impede PrEP persistence. This finding was reflective of existing research that found that the use of multimodal transportation may be associated with missed appointments and antiretroviral medication doses and less consistent HIV care.[82] Moreover, our study was likely unable to detect significant differences in PrEP persistence by active and multimodal transportation due to limited sample sizes for these modes; future studies should be better designed to detect associations between different transportation modes and PrEP persistence.

There are several potential explanations for our findings about the relationship between transportation mode and PrEP persistence among urban MSM. Public transit, including bus, subway, train, taxi, and rideshare services, can be unreliable and inflexible, with long pedestrian travel to a stop, commute times, wait times, and delays due to stops along a route.[68-70,82,163] Also, public transportation may not be extensively available in all communities of a metropolitan area and may not reach most PrEP clinics in an area, further limiting the opportunity for consistent PrEP care over time.[70,163] For active

transportation, the physical effort, weather, and longer commute times involved with biking or walking may be contributors to less PrEP care-seeking behavior and, therefore, less PrEP persistence among urban MSM who use active transportation.[171] Moreover, multimodal transportation may involve compounded logistical challenges with managing wait times and time spent using different transportation modes during a single one-way trip to a provider,[82] potentially leading to missed PrEP care appointments and, as a result, less PrEP persistence.

Our study suggests that travel-related barriers may reduce PrEP care utilization and retention when using transportation modalities other than private transportation for healthcare access. PrEP interventions developed for urban areas should aim to reduce structural barriers associated with using public transit and active and multimodal transportation. For instance, public health decision makers may target the allocation of PrEP clinics in urban areas primarily serviced by public transit to improve access to PrEP care in such areas. There may also be a need for more development of transportation systems, such as more transit routes, in areas with transportation accessibility issues. Moreover, not all transportation systems integrate biking and walking into the transit infrastructure, but complete streets infrastructure, such as suitable bike lanes and sidewalks, along pedestrian routes to PrEP clinics may improve the geographic mobility of MSM using active transportation, potentially facilitating access to and retention in PrEP care for this population.[172] Mobile clinics, telemedicine, and home-based approaches to deliver PrEP care may also be viable options to provide PrEP care and ancillary services without the need for transportation.[144] Addressing the HIV epidemic in metropolitan areas will require transportation-based interventions and policies to address structural barriers that hinder persistent PrEP use among urban MSM and other key populations.

There are limitations to our study. First, AMIS-2020 study participants were selected using convenience sampling and were not necessarily representative of the U.S. MSM population although representative of the general U.S. population. Second, we assumed the transportation mode participants reported using to access health care was how they accessed PrEP services; however, the mode of transportation used to access PrEP care may not be the same as for general health care, especially

considering PrEP-related stigma and the need for confidentiality when traveling to a PrEP clinic.[64,173-176] Third, MSM reported the mode of transportation they normally used in the past year, but their reported mode may have changed during the study period due to community mitigation policies (e.g., stay-at-home orders) enacted during the COVID-19 pandemic.[177] Fourth, we utilized current PrEP use among MSM who reported PrEP use in the past year as a measure of PrEP persistence, which may be an imperfect proxy. Finally, the COVID-19 pandemic in the U.S. altered transportation modes people used for travel[177] as well as healthcare services utilization,[161] potentially confounding our results. However, we measured current PrEP use to remove any potential time-varying confounding that may have been contributed by the COVID-19 pandemic.

Conclusions

Since the 1980s, the U.S. HIV epidemic has been and remains concentrated in urban areas. PrEP is an effective biomedical intervention that can help control the U.S. HIV epidemic, but PrEP persistence may be negatively impacted by transportation-related barriers to PrEP care. Widespread, disruptive events, such as the COVID-19 pandemic, may further impact retention in PrEP care. In this large, national, and multilevel study of 800 MSM in the U.S., we found that MSM using public transportation had lower odds of persistent PrEP use (aOR: 0.48; 95% CI: 0.24-0.95) than MSM using private transportation during the COVID-19 pandemic. There were no significant associations between PrEP persistence and active transportation (aOR: 0.62; 95% CI: 0.31-1.25) or multimodal transportation (aOR: 0.86; 95% CI: 0.55-1.34). Transportation-tailored structural interventions and policies are needed to improve persistent PrEP use among key MSM populations in urban areas.

Table 11. Characteristics of urban[a] MSM participants in the American Men's Internet Survey 2020 cycle, overall and by status of persistent PrEP use – United States.

Characteristics	Overall Study Population[b] N (%)	Persistent PrEP Use[c] N (%)	No Persistent PrEP Use[c] N (%)
Total	800 (100%)	619 (77.4%)	181 (22.6%)
Transportation Mode			
Private transportation	485 (60.6%)	382 (78.8%)	103 (21.2%)
Public transportation	70 (8.8%)	52 (74.3%)	18 (25.7%)
Active transportation	52 (6.5%)	38 (73.1%)	14 (26.9%)
Multimodal transportation	193 (24.1%)	147 (76.2%)	46 (23.8%)
Age (years)			
15-24	195 (24.4%)	130 (66.7%)	65 (33.3%)
25-29	287 (35.9%)	223 (77.7%)	64 (22.3%)
30-39	140 (17.5%)	115 (82.1%)	25 (17.9%)
40 and older	178 (22.3%)	151 (84.8%)	27 (15.2%)
Race/ethnicity			
Non-Hispanic White	437 (55.4%)	336 (76.9%)	101 (23.1%)
Non-Hispanic Black	102 (12.9%)	85 (83.3%)	17 (16.7%)
Hispanic	175 (22.2%)	138 (78.9%)	37 (21.1%)
Other/multiple races	75 (9.5%)	53 (70.7%)	22 (29.3%)
Educational attainment			
Less than a college degree	255 (31.9%)	191 (74.9%)	64 (25.1%)
College or postgraduate degree	545 (68.1%)	428 (78.5%)	117 (21.5%)
Annual household income			
$0 - $19,999	70 (9.1%)	53 (75.7%)	17 (24.3%)
$20,000 - $39,999	130 (17.0%)	102 (78.5%)	28 (21.5%)
$40,000 - $74,999	227 (29.6%)	184 (81.1%)	43 (18.9%)
$75,000 or more	340 (44.3%)	258 (75.9%)	82 (24.1%)
Health insurance coverage			
Private only	608 (76.4%)	469 (77.1%)	139 (22.9%)
Public only	87 (10.9%)	72 (82.8%)	15 (17.2%)
Other/multiple	52 (6.5%)	44 (84.6%)	8 (15.4%)
None	49 (6.2%)	32 (65.3%)	17 (34.7%)
Anticipated healthcare stigma			
Never	602 (75.3%)	467 (77.6%)	135 (22.4%)
Ever	198 (24.8%)	152 (76.8%)	46 (23.2%)
PrEP eligibility status			
Not eligible	119 (14.9%)	72 (60.5%)	47 (39.5%)
Eligible	681 (85.1%)	547 (80.3%)	134 (19.7%)
Region			
Northeast	177 (22.1%)	135 (76.3%)	42 (23.7%)
Midwest	134 (16.8%)	111 (82.8%)	23 (17.2%)
South	275 (34.4%)	216 (78.6%)	59 (21.5%)
West	214 (26.8%)	157 (73.4%)	57 (26.6%)

Notes: MSM, men who have sex with men; PrEP, pre-exposure prophylaxis.
[a]Urban was defined as residing in a ZIP code located in a large central metropolitan county.
[b]column %
[c]row %

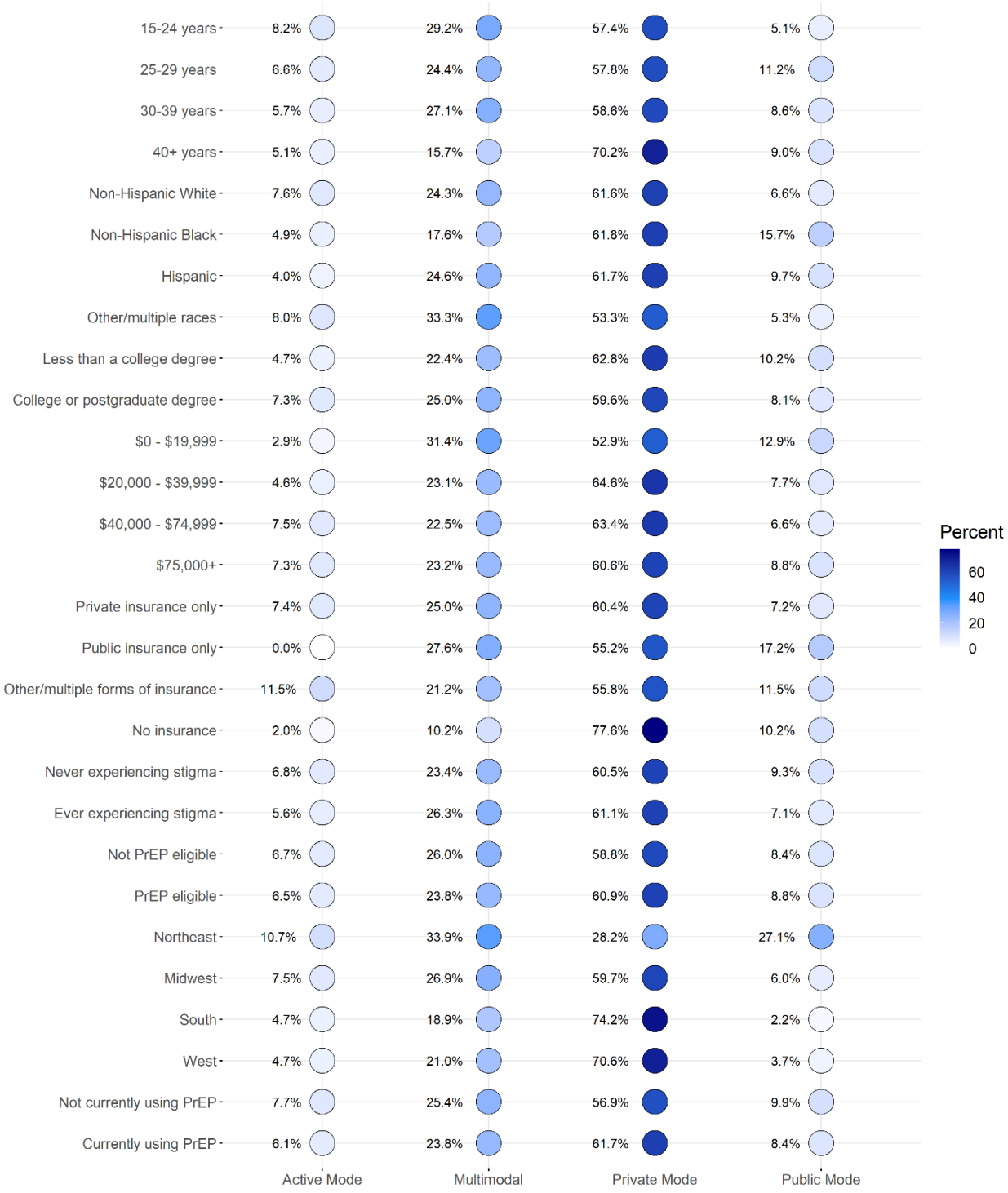

Figure 12. Characteristics of urban MSM participants in the American Men's Internet Survey 2020 cycle, by modes of transportation used to access health care – United States.

Notes: Urban was defined as residing in a ZIP code located in a large central metropolitan county. Percentages presented in the figure are row %.

Table 12. Associations between modes of transportation used to access health care and persistent PrEP use among urban[a] MSM participants in the American Men's Internet Survey 2020 cycle – United States.

	Model 1[b] OR (95% CI)	**Model 2**[c] aOR (95% CI)	**Model 3**[d] aOR (95% CI)	**Model 4**[e] aOR (95% CI)
Characteristics				
Transportation Mode				
Private transportation	Referent	Referent	Referent	Referent
Public transportation	0.78 (0.44-1.40)	0.60 (0.32-1.12)	0.56 (0.30-1.07)	**0.48 (0.24-0.95)**
Active transportation	0.73 (0.39-1.37)	0.68 (0.36-1.30)	0.69 (0.35-1.37)	0.62 (0.31-1.25)
Multimodal transportation	0.86 (0.59-1.27)	0.94 (0.61-1.44)	0.92 (0.60-1.41)	0.86 (0.55-1.34)
Age (years)				
15-24	Referent	Referent	Referent	Referent
25-29	**1.72 (1.13-2.63)**	**1.67 (1.02-2.73)**	1.58 (0.96-2.61)	1.59 (0.96-2.63)
30-39	**2.30 (1.36-3.90)**	**2.29 (1.23-4.26)**	**2.20 (1.18-4.12)**	**2.21 (1.17-4.16)**
40 and older	**2.80 (1.68-4.67)**	**2.96 (1.66-5.27)**	**2.87 (1.60-5.16)**	**2.96 (1.62-5.39)**
Race/ethnicity				
Non-Hispanic White	Referent	Referent	Referent	Referent
Non-Hispanic Black	1.52 (0.86-2.69)	1.53 (0.78-2.98)	1.76 (0.90-3.47)	1.71 (0.87-3.38)
Hispanic	1.14 (0.73-1.77)	1.36 (0.84-2.20)	1.32 (0.82-2.15)	1.43 (0.87-2.37)
Other/multiple races	0.72 (0.42-1.25)	0.87 (0.48-1.55)	0.95 (0.51-1.75)	0.99 (0.53-1.83)
Educational attainment				
Less than a college degree	Referent	Referent	Referent	Referent
College or postgraduate degree	1.22 (0.86-1.72)	0.93 (0.60-1.43)	0.95 (0.61-1.47)	0.94 (0.61-1.45)
Annual household income				
$0 - $19,999	0.99 (0.53-1.83)	1.32 (0.60-2.87)	1.25 (0.55-2.81)	1.23 (0.55-2.77)
$20,000 - $39,999	1.16 (0.71-1.87)	1.47 (0.85-2.53)	1.47 (0.84-2.57)	1.40 (0.79-2.48)
$40,000 - $74,999	1.35 (0.89-2.06)	1.51 (0.96-2.35)	1.53 (0.96-2.44)	1.49 (0.94-2.38)
$75,000 or more	Referent	Referent	Referent	Referent
Health insurance coverage				
Private only	Referent	Referent	Referent	Referent
Public only	1.41 (0.79-2.53)	1.11 (0.57-2.17)	1.19 (0.58-2.46)	1.22 (0.60-2.47)
Other/multiple	1.64 (0.75-3.55)	1.57 (0.67-3.70)	1.52 (0.65-3.54)	1.51 (0.64-3.54)
None	0.55 (0.29-1.02)	**0.42 (0.21-0.85)**	**0.41 (0.20-0.82)**	**0.42 (0.21-0.87)**
Anticipated healthcare stigma				
Never	Referent	–	Referent	Referent

Ever	0.94 (0.64-1.39)	0.96 (0.64-1.46)	0.98 (0.64-1.49)	1.00 (0.65-1.53)
PrEP eligibility status				
Not eligible	Referent	–	Referent	Referent
Eligible	**2.67 (1.78-4.01)**	–	**3.00 (1.91-4.73)**	**2.93 (1.86-4.61)**
Region				
Northeast	Referent	–	–	Referent
Midwest	1.50 (0.83-2.70)	–	–	1.14 (0.60-2.18)
South	1.13 (0.72-1.79)	–	–	0.82 (0.47-1.43)
West	0.86 (0.55-1.35)	–	–	0.62 (0.36-1.07)

Notes: MSM, men who have sex with men; PrEP, pre-exposure prophylaxis; OR, odds ratio; aOR, adjusted odds ratio
Bold values indicate statistical significance at $P < 0.05$.
[a]Urban was defined as residing in a ZIP code located in a large central metropolitan county.
[b]unadjusted
[c]adjusted for age, race/ethnicity, educational attainment, annual household income, health insurance coverage, and anticipated healthcare stigma
[d]adjusted for age, race/ethnicity, educational attainment, annual household income, health insurance coverage, anticipated healthcare stigma, and PrEP eligibility status
[e]adjusted for age, race/ethnicity, educational attainment, annual household income, health insurance coverage, anticipated healthcare stigma, PrEP eligibility status, and U.S. Census region

Chapter 5. Conclusions and Future Directions

As the study of the geographic accessibility of PrEP services is in its infancy,[71,73,74] this dissertation represents a scientific inquiry aiming to expand the understanding of PrEP accessibility over time and geography, by urbanicity, and in the context of transportation accessibility. In this dissertation, we applied three theoretical frameworks – Buot and colleagues' model of sociological determinants of HIV disparities, Penchansky and Thomas's model of healthcare access, and Andersen's behavioral model of health services use – to conceptualize each of our three dissertation aims, and we used novel methods to determine spatiotemporal PrEP deserts and oases as well as used a novel application of multilevel epidemiologic methods to examine the association between PrEP access at an area level and PrEP use at the individual level. In this final chapter, we summarize major findings from each of our three dissertation aims and assess the broader contributions and implications of these aims within the field of PrEP accessibility research. We also describe strengths and limitations of each dissertation aim as well as future directions in research.

Dissertation Aim 1

A focus of the EHE Initiative is expanding access to and use of PrEP, and investigating changes in the geographic distribution of PrEP accessibility over time is key for evaluating progress towards improving PrEP access. Using Buot et al.'s and Penchansky and Thomas's frameworks to conceptualize the structural landscape of PrEP accessibility and factors associated with such accessibility, we used data from the PrEP Locator database, a national database of PrEP-providing clinics, and conducted spatial network analyses and geographic mapping to investigate the spatial distribution of PrEP accessibility in the U.S. between 2016-2020 and factors contributing to this spatiotemporal distribution. We found a 52.8% decrease in PrEP deserts and a 33.5% increase in PrEP oases from 2016 to 2020, with 17.3% and 60.1% of U.S. census tracts being identified as persistent PrEP deserts and persistent PrEP oases, respectively. Generally, persistent PrEP oases were more likely to be of higher socioeconomic status,

racially and ethnically diverse, located in urban areas, and located in the Northeast compared with other spatiotemporal PrEP accessibility types. Unexpectedly, we found that new PrEP deserts in urban areas and the West had lower levels of persons with no high school education, yet higher levels of Hispanic/Latino persons compared with persistent PrEP oases. Future studies should further investigate these unexpected findings. Overall, in Dissertation Aim 1, we developed and presented methods that can be replicated and used throughout the remaining years of the EHE Initiative to continue monitoring the prevalence of PrEP deserts and oases over time as more data become available in the PrEP Locator database. Dissertation Aim 1 can support public health decision makers with evaluating progress made towards improving PrEP accessibility and allocating public health resources to areas that have persistently had suboptimal spatial accessibility to PrEP-providing clinics.

There are several strengths of Dissertation Aim 1 to address. First, only one single study has defined and examined areas that are PrEP deserts in the U.S., which was cross-sectional in nature.[73] In Dissertation Aim 1, we developed a novel definition of four types of spatiotemporal PrEP deserts and oases, using longitudinal data to understand the changing geographic distribution of PrEP accessibility in the U.S. between 2016-2020. A second strength is the recency of the geolocation data on PrEP-providing clinics that were used in Dissertation Aim 1. In previous research, data on PrEP-providing clinics from the PrEP Locator database dated back to 2017;[73] in Dissertation Aim 1, we used PrEP Locator data from 2020 in efforts to measure PrEP deserts and oases using the most recent data available at the time of the study. In addition, there are some limitations of Dissertation Aim 1 to address. First, we used PrEP Locator data from September 2020, overlapping with the COVID-19 pandemic.[178] The COVID-19 pandemic may have disrupted the accessibility and availability of PrEP healthcare infrastructure, and we were not able to investigate such a possibility in our study. As a second limitation, due to the paucity of research on areas identified as PrEP deserts,[73] our study is exploratory in nature, preventing the design and conduct of more robust, hypothesis-driven research. Nonetheless, our research can serve as the foundation for future studies to examine the geographic distribution and determinants of PrEP deserts and oases over time.

Dissertation Aim 2

The U.S. HIV epidemic is a public health issue that increasingly affects MSM residing in nonurban areas, and increasing access to and use of PrEP among MSM in these areas can address the growing HIV epidemic. Using Andersen's and Penchansky and Thomas's frameworks to study the extent to which PrEP accessibility affects PrEP use, we used data from the PrEP Locator database and the American Men's Internet Survey and conducted multilevel log-binomial regression to examine the association between residing in a PrEP desert and PrEP use at the individual level among MSM residing in nonurban areas. Of 4,792 PrEP-eligible nonurban MSM, 20.1% resided in a PrEP desert, and 15.2% used PrEP in the past year. Overall, nonurban MSM who resided in PrEP deserts were 30% less likely to use PrEP in the past year compared with MSM who did not reside in PrEP deserts. After assessing effect modification by nonurban ZIP code of residence, we also found that suburban MSM residing in PrEP deserts were 65% less likely to use PrEP in the past year than those not residing in PrEP deserts. Other nonurban MSM residing in PrEP deserts were 25% less likely to use PrEP in the past year than those not residing in PrEP deserts. Dissertation Aim 2 can be used to inform structural interventions to address PrEP deserts and low PrEP use among MSM in nonurban areas in the U.S.

There are strengths of Dissertation Aim 2 to address. First, we used individual-level data from the American Men's Internet Survey (AMIS), a large, online national study of MSM and their health behaviors. AMIS includes MSM who may not be included in existing HIV behavioral surveillance systems. For example, CDC's National HIV Behavioral Surveillance (NHBS) system collects data every three years on MSM recruited from MSM-frequented venues in major metropolitan areas.[179] The AMIS study complements CDC's NHBS by studying MSM annually from a larger geographic extent beyond metropolitan areas. Second, Dissertation Aim 2 applies a novel use of epidemiologic multilevel study design to estimate the association between drive-time PrEP accessibility at the ZIP code level and actualized usage of PrEP at the individual level. There is a key limitation of Dissertation Aim 2 that also

needs to be addressed. We made an assumption that PrEP users in the study population would have obtained PrEP from clinics registered in the PrEP Locator database. We were not able to evaluate this assumption, but future studies may want to assess this assumption in analyses by restricting to PrEP users who report obtaining PrEP medications from a healthcare provider. While this still assumes that the providers from whom PrEP users obtain their PrEP medications are included in the PrEP Locator database, this proposed analysis would achieve a study population that includes PrEP users who obtain PrEP from healthcare providers and excludes PrEP users who obtain PrEP from non-clinical sources, such as a sexual partner or friend.

Dissertation Aim 3

The U.S. HIV epidemic has been concentrated in urban areas since it was identified in the early 1980s, and improving PrEP persistence among disproportionately affected urban populations can help control the epidemic in these areas. Transportation accessibility, such as modes of transportation used to travel to a healthcare provider, can be a barrier to retention in PrEP care and PrEP persistence. The widespread and disruptive COVID-19 pandemic may have also been a barrier to PrEP persistence. Using Andersen's and Penchansky and Thomas's frameworks to study the extent to which transportation accessibility affects continued PrEP use, we used data from the American Men's Internet Survey and conducted multilevel logistic regression to examine the relationship between modes of transportation used to access health care and persistent PrEP use among MSM in urban areas during the COVID-19 pandemic. Of 800 MSM residing in urban areas across the U.S., 60.6% used private transportation to access health care, and 77.4% of MSM who reported PrEP use in the past year were persistent PrEP users. After adjustment, MSM who used public transportation to access health care had 0.48 times lower odds of PrEP persistence than MSM who used private transportation. Although insignificant, MSM who used active transportation to access health care had 0.62 times lower odds of PrEP persistence than MSM who used private transportation, and MSM who used multimodal transportation to access health care had 0.86

times lower odds of PrEP persistence than MSM who used private transportation. Overall, the findings from Dissertation Aim 3 can be used to inform structural interventions and transportation policies in urban areas to address travel-related barriers to accessing PrEP care and maintaining PrEP use over time.

Lastly, there are strengths of Dissertation Aim 3 that need to be addressed. Aside from utilizing individual-level data from AMIS, a strength of Dissertation Aim 3 is that we applied a novel application of epidemiologic multilevel study design to estimate the association between actualized persistent usage of PrEP and transportation accessibility as measured by mode of transportation used to access health care. Second, research on how the use of PrEP services is connected to transportation accessibility via transportation modes is largely nonexistent; we contributed to the knowledge base by providing an assessment of the impact of mode of transportation on persistent PrEP use among urban MSM. There is a key limitation of Dissertation Aim 3 that requires addressing. We measured transportation accessibility for MSM categorically by four types of transportation modes used to access a typical healthcare provider. Unlike with our other two dissertation aims, we did not measure the travel time associated with particular modes of transportation, and future studies should measure travel time by transportation mode to more comprehensively understand the relationship between transportation accessibility and persistent PrEP use.

Conclusions

In conclusion, the overarching goal of this dissertation was to use a multilevel, spatially informed approach to better conceptualize the geographic accessibility of PrEP services and its impact on actualized PrEP uptake among MSM populations. We used Buot and colleagues' model to investigate the structural landscape of PrEP services infrastructure in the U.S., and we used Penchansky and Thomas's model to inform the measurement of the spatial accessibility of PrEP-providing clinics in the U.S. We also used Andersen's model to conceptualize the structural factors influencing the utilization of PrEP healthcare service. Guided by these three frameworks, this dissertation has furthered the knowledge base regarding the role of place in PrEP access and use among disproportionately affected MSM populations.

Our findings underscore the importance of understanding changes in the spatial accessibility of PrEP services over time and contributed methods that can support evaluating the efforts of the U.S. Ending the HIV Epidemic Initiative. Our findings also emphasize the importance of travel time and transportation mode for PrEP use and PrEP persistence among nonurban MSM and urban MSM, respectively. Structural interventions are needed to address transportation-related barriers to PrEP access to facilitate PrEP use and persistent PrEP care among disproportionately affected MSM populations in nonurban and urban communities across the U.S. Addressing these structural and spatial barriers to PrEP uptake through the allocation of PrEP services, improvement of transportation systems, and utilization of telemedicine, home-based PrEP programs, and mobile PrEP clinics can help increase PrEP use and persistence in communities of need and reach the goals of the U.S. Ending the HIV Epidemic Initiative.

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Appendix

Appendix A: The American Men's Internet Survey 2020 Questionnaire

Sex is the Question - 2020

Join over 10,000 men in the U.S. by taking our annual sexual health survey!

This annual survey, led by researchers at Emory University in Atlanta, collects information to help us better understand patterns of behavior – both sexual and health promoting – among men like you. Your participation can help ensure prevention resources have the greatest impact for the community.

We will first ask you some question to determine if you are eligible to participate. If you are not eligible, we may ask you to provide an email address so we can contact you about future research studies for which you may be eligible. Providing your email address is completely optional.

Click or tap the arrow or “Next” button below to be a part of this national effort!

Any information shared in this survey is strictly confidential and will only be used for research study purposes. All the information that we gather from you today is safely stored.

Eligibility Screener

Page exit logic: Skip / Disqualify Logic **IF:** "How old are you?" is less than "15" **THEN:** Disqualify and display: "Sorry, you do not qualify to take this survey. Thank you for your time!"

Please enter your age in years, not your birth year.

How old are you? *

AGE

Page entry logic: This page will show when: "How old are you?" is greater than or equal to "15"

Eligibility screener

Questions marked with * are required.

Do you consider yourself to be Hispanic or Latino? *

HISPANIC

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Which racial group or groups do you consider yourself to be in? Check all that apply. *

[ ] American Indian or Alaska Native	**RACEA**
[ ] Asian	**RACEB**
[ ] Black or African American	**RACEC**
[ ] Native Hawaiian or Other Pacific Islander	**RACED**
[ ] White	**RACEE**
[ ] I prefer not to answer	**RACEF**
[ ] Does not apply	**RACEG**
[ ] Don't know	**RACEH**

What country do you live in? *

COUNTRY_RES

(1) United States
(2) Mexico
(3) Other country

Logic: "What country do you live in?" is one of the following answers ("United States")

What ZIP Code do you live in? *

ZIPCODE

_____

How do you describe your current gender identity? You can choose more than one answer. *

[ ] Male	**GENDER_MALE**
[ ] Female	**GENDER_FEMALE**
[ ] Transgender woman (male-to-female transgender)	**GENDER_MTF**
[ ] Transgender man (female-to-male transgender)	**GENDER_FTM**
[ ] Other gender identity	**GENDER_OTH**
[ ] I prefer not to answer	**GENDER_REF**
[ ] Don't know	**GENDER_DK**

Logic: "How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("Other gender identity")

What is your other gender identity?

GENDER_OTHSPEC

_____

What sex were you assigned at birth? *

BIRTHSEX

(1) Male
(2) Female
(3) Intersex/ambiguous
(7) I prefer not to answer
(9) Don't know

Eligibility Screener

Questions marked with * are required.

Logic: "How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Male"))

Have you <u>ever</u> had vaginal sex (penis in the vagina) or anal sex (penis in the butt) with a woman? *

EVERMSW

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Male"))

Have you <u>ever</u> had oral sex (mouth on the penis) with a man? *

E_EVRMSM_ORAL

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Male"))

Have you <u>ever</u> had anal sex (penis in the butt) with a man? *

E_EVRMSM_ANAL

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Page exit logic: Skip / Disqualify Logic **IF:** ((("What country do you live in?" is one of the following answers ("Mexico", "Other country") OR ((((("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Male")) AND "Have you **<u>ever</u>** had oral sex (mouth on the penis) with a man?" is not one of the following answers ("Yes")) AND "Have you **<u>ever</u>** had anal sex (penis in the butt) with a man?" is not one of the following answers ("Yes")) AND "Do you consider yourself to be:" is not one of the following answers ("Homosexual, Gay or Lesbian", "Bisexual"))) OR (("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Female") AND

"What sex were you assigned at birth?" is one of the following answers ("Female")) AND "Do you consider yourself to be:" is not one of the following answers ("Homosexual, Gay or Lesbian", "Bisexual", "Another sexual identity"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("I prefer not to answer") OR "What sex were you assigned at birth?" is one of the following answers ("I prefer not to answer"))) **THEN:** Disqualify and display: "Sorry, you do not qualify to take this survey. Thank you for your time!"

Logic: ((("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Male")) AND "Have you ever had oral sex (mouth on the penis) with a man?" is one of the following answers ("No", "I prefer not to answer", "Don't know")) AND "Have you ever had anal sex (penis in the butt) with a man?" is one of the following answers ("No", "I prefer not to answer", "Don't know"))

How do you describe your current sexual identity? *

IDENTITY_SCREEN

(1) Homosexual, Gay or Lesbian
(4) Homosexual or Lesbian
(2) Heterosexual or Straight
(3) Bisexual
(7) I prefer not to answer
(9) Don't know

Logic: ((((("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Female") AND "What sex were you assigned at birth?" is one of the following answers ("Female")) OR ("How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("Transgender woman (male-to-female transgender)","Transgender man (female-to-male transgender)","Other gender identity", "Don't know") OR "How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male", "Female"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Female", "Intersex/ambiguous"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Female") AND "What sex were you assigned at birth?" is one of the following answers ("Male", "Intersex/ambiguous")))

How do you describe your current sexual identity? *

IDENTITY_SCREEN_INELIG

(1) Homosexual, Gay or Lesbian
(4) Homosexual or Lesbian
(2) Heterosexual or Straight
(3) Bisexual
(4) Another sexual identity
(7) I prefer not to answer
(9) Don't know

Page entry logic: ((((("How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("Transgender woman (male-to-female transgender)","Transgender man (female-to-male transgender)","Other gender identity", "Don't know") OR "How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male", "Female")) OR (("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Female") AND "What sex were you assigned at birth?" is one of the following answers ("Female")) AND "Do you consider yourself to be:" is one of the following answers ("Homosexual, Gay or Lesbian", "Bisexual", "Another sexual identity"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Female", "Intersex/ambiguous"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Female") AND "What sex were you assigned at birth?" is one of the following answers ("Male", "Intersex/ambiguous")))

Future Contact for Ineligible

Page exit logic: Skip / Disqualify Logic **IF:** ((((("How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("Transgender woman (male-to-female transgender)","Transgender man (female-to-male transgender)","Other gender identity", "Don't know") OR "How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Male", "Female")) OR (("How do you describe your current gender identity? You can choose more than one answer. " is exactly equal to ("Female") AND "What sex were you assigned at birth?" is one of the following answers ("Female")) AND "Do you consider yourself to be:" is one of the following answers ("Homosexual, Gay or Lesbian", "Bisexual"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("Male") AND "What sex were you assigned at birth?" is one of the following answers ("Female", "Intersex/ambiguous"))) OR ("How do you describe your current gender identity? You can choose more than one answer. " is one of the following answers ("Female") AND "What sex were you assigned at birth?" is one of the following answers ("Male", "Intersex/ambiguous"))) **THEN:** Disqualify and display: "Thanks for your interest! You can now close your browser."

You are not eligible for this survey, but the PRISM Health team conducts many research projects at Emory University. Would you like to be contacted for potential participation in our future projects?

FUTURECONTACT_INELG

(1) Yes
(0) No

Logic: "You are not eligible for this survey, but the PRISM Health team conducts many research projects at Emory University. Would you like to be contacted for potential participation in our future projects?" is one of the following answers ("Yes")

Please provide the email address you would like for us to use to contact you for future studies.

EMAIL_INELG
_____

Page entry logic: This page will show when: "How old are you?" is greater than or equal to "17"

Consent

Page exit logic: Skip / Disqualify Logic **IF:** "Please indicate whether you agree to participate in the survey." is one of the following answers ("I do not agree to participate in the survey.") **THEN:** Disqualify and display: "Thank you for your interest! You may now close your browser."

Thank you for your interest in our survey. The video below will give you more information about the survey. Please watch it and indicate below whether you agree to participate.

You may also download the full consent form at the link below the video.

Please note:

1. **Your answers are confidential: we don't have any information about who you are beyond the questions you answer.**
2. **This survey includes some personal questions. You can choose to not answer any questions that make you feel uncomfortable.**

If you have any questions or comments you may contact the research staff at amis@emory.edu.

Please indicate whether you agree to participate in the survey. *

CONSENT

(1) I agree to participate in the survey.
(0) I do not agree to participate in the survey.

Click here for a printable version of the consent form.

Page entry logic: This page will show when: "How old are you?" is less than "17"

Assent

Page exit logic: Skip / Disqualify Logic **IF:** "Please indicate whether you agree to participate in the survey." is one of the following answers ("I do not agree to participate in the survey.") **THEN:** Disqualify and display: "Thank you for your interest! You may now close your browser."

Thank you for your interest in our survey! The video below will give you more information. Please watch it and indicate below whether you agree to participate.

You may also download the full assent form at the link below the video.

Please Note:

1. **Your answers are confidential: we don't have any information about who you are beyond the questions you answer.**
2. **This survey includes some personal questions. You can choose to not answer any questions that make you feel uncomfortable.**

If you have any questions or comments you may contact the research staff at amis@emory.edu.

Please indicate whether you agree to participate in the survey. *

ASSENT

(1) I have read the information below. I agree to participate in this survey.
(0) I do not agree to participate in the survey.

Click here for a printable version of the assent form.

Demographics

What is your primary language?

PLANGUAGE

(1) English
(2) Spanish
(3) Another language
(7) I prefer not to answer

Logic: "What is your primary language?" is one of the following answers ("Another language")

What language is your primary language?

PLANGUAGE_OTHSPEC

_____

Are you currently enrolled in school?

CURRENROLL

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

What is the highest level of education you completed?

HLEDUCAT

(0) Never attended school
(1) Less than high school
(2) Some high school

(3) High school diploma or GED
(4) Some college, Associate's Degree, or Technical Degree
(5) College, post graduate or professional school
(77) I prefer not to answer
(99) Don't know

Demographics: Employment Status & Food Insecurity

Which best describes your current employment status?

EMPLOYMENT

(1) Employed for wages full-time

(2) Employed for wages part-time

(3) Self employed

(4) A homemaker

(Student) Student

(5) Retired

(0) Not employed

(6) Unable to work (disabled)

(77) Prefer not to answer

Logic: "Which best describes your current employment status?" is one of the following answers ("Not employed")

Were you laid off or furloughed from your job, as a result of COVID-19?

JOB_COVID

(1) Yes

(2) No, I was laid off or furloughed for other reasons

(88) Not applicable, I was not working prior to COVID-19

In the past 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food?

FOOD_SEC

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: Question "In the past 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food?" is one of the following answers ("Yes")

How often did this happen?

FOOD_SEC_FREQ

(1) Almost every month
(2) Some months but not every month
(3) Only 1 or 2 months
(7) I prefer not to answer
(9) Don't know

Demographics: Income

What was your household income last year from all sources before taxes? That is, the total amount of money earned and shared by all people living in your household.

HHINCOME

(0) $0 to $19,999 annually ($0 to $1,666 monthly)
(1) $20,000 to $39,999 annually ($1,667 to $3,333 monthly)
(2) $40,000 to $74,999 annually ($3,334 to $6,249 monthly)
(3) $75,000 to $99,999 annually ($6,250 to $8,333 monthly)
(4) $100,000 to 124,999 annually ($8,334 to $10,416 monthly)
(5) $125,000 to $149,999 annually ($10,417 to $12,499 monthly)
(6) $150,000 or more annually ($12,500 or more monthly)
(77) I prefer not to answer
(99) Don't know

Logic: "What was your household income last year from all sources before taxes? That is, the total amount of money earned and shared by all people living in your household." is one of the following answers ("$0 to $19,999 annually ($0 to $1,666 monthly)","$20,000 to $39,999 annually ($1,667 to $3,333 monthly)","$40,000 to $74,999 annually ($3,334 to $6,249 monthly)","$75,000 to $99,999 annually ($6,250 to $8,333 monthly)","$100,000 to $124,999 annually ($8,334 to $10,416 monthly)","$125,000 to $149,999 annually ($10,417 to $12,499 monthly)","$150,000 or more annually ($12,500 or more monthly)")

Including yourself, how many people depend on this income?

DEPEND

_____

Logic: "Including yourself, how many people depend on this income?" is greater than or equal to "2"

Of the people who depend on this income, how many are under the age of 18?

DEPEND_under18

_____

Demographics: Hispanic Ethnicity

What country were you born in?

COUNTRY_BORN

[Country dropdown – US first]

Logic: "What country were you born in?" is one of the following answers ("United States and territories (including Puerto Rico)")

Which state or territory were you born in?

STATE_BORN

[State dropdown]

Logic: "Do you consider yourself to be Hispanic or Latino?" is one of the following answers ("Yes") AND "What country were you born in?" is one of the following answers ("United States and territories (including Puerto Rico)"))

Which of the following describes your Hispanic/Latino heritage? You may choose more than one option.

[ ] Argentine	**ARGENTINE**
[ ] Bolivian	**BOLIVIAN**
[ ] Brazilian	**BRAZILIAN**
[ ] Chilean	**CHILEAN**

[ ] Colombian **COLOMBIAN**
[ ] Costa Rican **COSTARICAN**
[ ] Cuban **CUBAN**
[ ] Dominican **DOMINICAN**
[ ] Ecuadorian **EDUADORIAN**
[ ] Guatemalan **GUATEMALAN**
[ ] Honduran **HONDURAN**
[ ] Mexican **MEXICAN**
[ ] Nicaraguan **NICARAGUAN**
[ ] Panamanian **PANAMANIAN**
[ ] Paraguayan **PARAGUAYAN**
[ ] Peruvian **PERUVIAN**
[ ] Puerto Rican **PUERTORICAN**
[ ] Salvadoran **SALVADORAN**
[ ] Spanish **SPANISH**
[ ] Uruguayan **URUGUAYAN**
[ ] Venezuelan **VENEZUELAN**
[ ] Other: _____ **HISP_OTHER**

Page entry logic: ("What country were you born in?" is not one of the following answers ("United States and territories (including Puerto Rico)") AND "What country were you born in?")

Demographics: Arrival to US

What year did you first come to live in the United States? If you don't know, please enter 9999.

US_YEAR

_____

How old were you when you first came to live in the U.S.? If you don't know, please enter 9999.

US_AGE

_____

What are the reason(s) you first came to live in the United States? Check all that apply.

[ ] To improve financial situation (to take a job or find work) **LIVEUS_FINANCE**

[ ] To live more openly as gay/bi/queer **LIVEUS_LIVEOPEN**
[ ] To live with or join a lover, boyfriend, or husband **LIVEUS_LOVER**
[ ] To be able to marry my male partner **LIVEUS_MARRY**
[ ] To study **LIVEUS_STUDY**
[ ] To be with family or friends **LIVEUS_FAMFRI**
[ ] I came here as a tourist and decided to stay **LIVEUS_TOURIST**
[ ] To receive medical care **LIVEUS_MED**
[ ] To escape violence or persecution for being gay/bi/queer **LIVEUS_PRESECGAY**
[ ] To escape violence or persecution for other reasons **LIVEUS_PERSECOTH**
[ ] To find political asylum **LIVEUS_POLASYLU**
[ ] It was not my decision to come to the US **LIVEUS_NOT**
[ ] Other reason: _____ **LIVEUS_OTH** **LIVEUS_OTHSPEC**
[ ] I prefer not to answer **LIVEUS_REF**
[ ] Don't know **LIVEUS_DK**

In the past 12 months, have you been back to the country where you were born?

RETURNP12M

(1) Yes
(0) No

Housing

Do you live alone?

LIVE_ALONE

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Do you live alone?" is one of the following answers ("No")

Who are the people who live with you? Choose all that apply.

[ ] Partner **LIVE_PARTNER**
[ ] Child or children **LIVE_CHILD**
[ ] Parent(s) **LIVE_PARENT**
[ ] Sibling(s) **LIVE_SIBLING**
[ ] Other family member(s) **LIVE_OTHFAM**

[ ] Friend(s) **LIVE_FRIEND**
[ ] Roommate(s) **LIVE_ROOMMATE**
[ ] Other, please specify: _____ **LIVE_OTHSPEC**

In the past 12 months, did you double up or stay overnight with friends, relatives, or someone you didn't know well because you didn't have a regular, adequate, and safe place to stay at night?

HOMELESS_FR

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

In the past 12 months, were you ever homeless? That is, were you living on the street, in a shelter, in a Single Room Occupancy hotel (SRO), or in a car?

HOMELESS_P12M

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Healthcare

What kind of health insurance or health care coverage do you currently have? Choose all that apply.

Health insurance--health plans people get through employment or purchased directly as well as government programs (like Medicare and Medicaid) that provide medical care or help pay medical bills.

[ ] My parent's health plan **TYP_INSA3**
[ ] A private health plan purchased through an employer **TYP_INSA**
[ ] A private health plan purchased through an exchange (i.e. Obamacare) **TYP_INSA2**
[ ] Medicaid or Medicare **TYP_INSG**
[ ] Some other Medical Assistance program **TYP_INSH**
[ ] TRICARE (CHAMPUS) **TYP_INSD**
[ ] Veterans Administration coverage **TYP_INSE**

[ ] Some other health care plan **TYP_INSF**
[ ] I don't currently have any health insurance **TYP_INSI**
[ ] I prefer not to answer **TYP_INSB**
[ ] Don't know **TYP_INSC**

Healthcare providers

In the past 12 months, have you seen a doctor, nurse, or other health care provider about your own health?

SEEHCP

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months, have you seen a doctor, nurse, or other health care provider about your own health?" is one of the following answers ("Yes")

In the past 12 months, when you saw a health care provider, was your appointment with that provider in person or by video or phone? Please choose all that apply.

[ ] In person **HCPVISIT_PERS**
[ ] By video or phone **HCPVISIT_REMOTE**
[ ] I prefer not to answer **HCPVISIT_DTA**
[ ] Don’t know **HCPVISIT_DK**

Logic: "In the past 12 months, when you saw a health care provider, was your appointment with that provider in person or by video or phone? Please choose all that apply." is one of the following answers ("In person")

In the past 12 months (since in [MONTH/YEAR]), how did you normally get to a doctor, nurse, or other healthcare provider to receive healthcare services? Check all that apply

[ ] I drove **TRANSITTOHCP_A**
[ ] I had a friend or family member drive me **TRANSITTOHCP_B**
[ ] I rode the subway/train/bus **TRANSITTOHCP_C**
[ ] I took a taxi, Uber or Lyft **TRANSITTOHCP_D**
[ ] I rode a bicycle **TRANSITTOHCP_E**
[ ] I walked **TRANSITTOHCP_F**
[ ] Other, please specify: **TRANSITTOHCP_OTHSP**

Page entry logic: This page will show when: "**In the past 12 months**, have you seen a doctor, nurse, or other health care provider about your own health?" is one of the following answers ("Yes")

Healthcare, cont'd

At any of those times you were seen by a doctor or health care provider, were you offered an HIV test? An HIV test checks whether someone has the virus that causes AIDS.

RECCHIV

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Did your doctor or health care provider talk to you about sex (gay or straight) or sexual health?

RECCSEX

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Outness

Logic: "How do you describe your current sexual identity?"

How do you describe your current sexual identity?

IDENTITY

(1) Heterosexual or Straight
(2) Homosexual or Gay
(3) Bisexual
(4) Another sexual identity
(7) I prefer not to answer

(9) Don't know

Logic: "How do you describe your current sexual identity?" is one of the following answers ("Another sexual identity")

What is your sexual identity?

IDENTITY_OTH

_____

Have you ever told anyone that you are attracted to or have sex with men?

OUT_GI

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: "Have you **ever** told anyone that you are attracted to or have sex with men?" is one of the following answers ("Yes")

Outness

Who of the following people have you told that you are attracted to or have sex with men?

	No	**Yes**	**Does not apply**
OUT_GIA Gay, lesbian, or bisexual friends	(0)	(1)	(2)
OUT_GIB Friends who are not gay, lesbian, or bisexual	(0)	(1)	(2)
OUT_GIC Family members	(0)	(1)	(2)
OUT_GID Health care provider	(0)	(1)	(2)

OUT_GIE Employer	(0)	(1)	(2)
OUT_GIF Fellow employees	(0)	(1)	(2)

Logic: "Health care provider" is one of the following answers ("Yes"))

Have you told your regular healthcare provider you are attracted to or have sex with men? "Regular" means a provider you have seen more than one time for a preventive health service (physical exam or check-up) or sick visit.

OUTHCP

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

AUDIT-C

For the next set of questions, a drink of alcohol is a 12 oz can or bottle of beer, a 5 oz glass of wine, or a 1.5 oz shot of liquor. A 40 oz beer would count as 3 drinks. A cocktail with 2 shots would count as 2 drinks.

How often did you have a drink containing alcohol in the past year?

AUDITC_OFTEN

(0) Never
(1) Monthly or less
(2) 2 to 4 times a month
(3) 2 to 3 times a week
(4) 4 to 5 times a week
(5) 6 or more times a week

Logic: "How often did you have a drink containing alcohol in the past year?" is one of the following answers ("Monthly or less","2 to 4 times a month","2 to 3 times a week","4 to 5 times a week","6 or more times a week")

How many drinks did you have on a typical day when you were drinking in the past year?

AUDITC_NUM

(0) 1 to 2 drinks
(1) 3 to 4 drinks
(2) 5 to 6 drinks
(3) 7 to 9 drinks
(4) 10 or more drinks

Logic: "How often did you have a drink containing alcohol in the past year?" is one of the following answers ("Monthly or less","2 to 4 times a month","2 to 3 times a week","4 to 5 times a week","6 or more times a week")

How often did you have 6 or more drinks on one occasion in the past year?

AUDITC_6DRINKS

(0) Never
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily

Substance Use: Injection Drug Use

The next questions are about injection drug use. This means injecting drugs yourself or having someone who isn't a health care provider inject you.

Have you ever in your life shot up or injected any drugs other than those prescribed for you? By shooting up, we mean anytime you might have used drugs with a needle, either by mainlining, skin popping, or muscling.

EVR_INJ

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Have you ever in your life shot up or injected any drugs other than those prescribed for you? By shooting up, we mean anytime you might have used drugs with a needle, either by mainlining, skin popping, or muscling." is one of the following answers ("Yes")

In the past 12 months, on average, how often did you inject?

AVGINJ

(01) More than once a day
(02) Once a day
(03) More than once a week
(04) Once a week
(05) More than once a month
(06) Once a month
(07) Less than once a month
(00) Never
(77) I prefer not to answer
(99) Don't know

Logic: "In the past 12 months, on average, how often did you inject?" is one of the following answers ("More than once a day", "Once a day", "More than once a week", "Once a week", "More than once a month", "Once a month", "Less than once a month")

Which drug do you inject most often?

DCHOICE

(1) Speedball - Heroin and cocaine together
(2) Heroin, by itself
(3) Cocaine, by itself
(4) Crack
(5) Crystal, meth, tina, crank, ice
(6) Something else (Specify): _____

(7) I prefer not to answer
(9) Don't know

Substance Use: NARCAN & Trimix/Caverject

Logic: Variable GROUPA is exactly equal to "1"

Did you know NARCAN (also called Naloxone) can be used to reverse a drug overdose?

NARCAN_AWARE

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Did you know NARCAN (also called Naloxone) can be used to reverse a drug overdose?" is one of the following answers ("Yes")

Do you know where to access NARCAN (also known as Naloxone) in your area?

NARCAN_LOC

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: Variable GROUPA is exactly equal to "2"

Have you ever used an injectable erection enhancing drug, sometimes called Trimix or Caverject?

ERECTIONINJ_EVER

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Have you ever used an injectable erection enhancing drug, sometimes called Trimix or Caverject?" is one of the following answers ("Yes")

When injecting Trimix, Caverject or other erection enhancing drugs, have you ever shared a needle with someone else?

ERECTIONINJ_NEEDLE

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Substance Use: Non-Injection Drug Use

The next questions are about drugs that you may have used but did not inject.

In the past 12 months, have you used any non-injection drugs (drugs you did not inject), other than those prescribed for you.

NIUSE12

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months, have you used any non-injection drugs (drugs you did not inject), other than those prescribed for you." is one of the following answers ("Yes")

In the past 12 months, which drugs that were not prescribed to you did you use? (Check all that apply.)

[ ] Marijuana	**NIUSEA**
[ ] Powdered cocaine (smoked or snorted)	**NIUSEB**
[ ] Poppers (amyl nitrate)	**NIUSEC**
[ ] X or Ecstasy	**NIUSED**
[ ] Painkillers (Oxycontin, Vicodin, Percocet)	**NIUSEE**
[ ] Downers (Valium, Ativan, Xanax)	**NIUSEF**
[ ] Crystal meth (tina, crank, ice)	**NIUSEG**
[ ] Hallucinogens (LSD, mushrooms)	**NIUSEH**

[ ] Special K (ketamine)	**NIUSEI**
[ ] GHB	**NIUSEJ**
[ ] Crack cocaine	**NIUSEK**
[ ] Heroin (smoked or snorted)	**NIUSEL**
[ ] I prefer not to answer	**NIUSEM**
[ ] Other drug: _____	**NIUSEN_OTHR**
[ ] Don't know	**NIUSEO**

Page entry logic: This page will show when: "**In the past 12 months**, which drugs that were not prescribed to you did you use? (Check all that apply.)" is one of the following answers ("Marijuana", "Powdered cocaine (smoked or snorted)","Poppers (amyl nitrate)","X or Ecstasy", "Painkillers (Oxycontin, Vicodin, Percocet)","Downers (Valium, Ativan, Xanax)","Crystal meth (tina, crank, ice)","Hallucinogens (LSD, mushrooms)","Special K (ketamine)","GHB", "Crack cocaine", "Other drug", "Heroin (smoked or snorted)")

Substance Use: Drug use frequency

In the past 12 months, how often did you use [DRUG NAME]?

NIUSEA_freq, NIUSEB_freq, NIUSEC_freq, NIUSED_freq, NIUSEE_freq, NIUSEF_freq, NIUSEG_freq, NIUSEH_freq, NIUSEI_freq, NIUSEJ_freq, NIUSEK_freq, NIUSEL_freq, NIUSEN_freq

(01) More than once a day
(02) Once a day
(03) More than once a week
(04) Once a week
(05) More than once a month
(06) Once a month
(07) Less than once a month
(77) I prefer not to answer
(99) Don't know

Substance Use: Legal Marijuana

In the past 12 months, have you been prescribed marijuana and had it filled at a legal dispensary?

MJ_MED

(0) No
(1) Yes
(7) I prefer not to answer

(9) Don't know

Sexual Behavior: Female Sex Partners

The next questions are about having sex with women. For those questions, “having sex” means oral, vaginal, or anal sex. Oral sex means mouth on the vagina or penis; vaginal sex means penis in the vagina; and anal sex means penis in the anus (butt).

In the past 12 months (since in [MONTH/YEAR]), what types of sex have you had with a woman? (Check all that apply.)

[ ] Oral sex	**M_FSXA**
[ ] Vaginal sex	**M_FSXB**
[ ] Anal sex	**M_FSXC**
[ ] Some other type of sex	**M_FSXG**
[ ] I have not had any type of sex with a woman in the past 12 months	**M_FSXD**
[ ] I prefer not to answer	**M_FSXE**
[ ] Don't know	**M_FSXF**

Page entry logic: "**In the past 12 months** (since [MONTH/YEAR]), what types of sex have you had with women?" is one of the following answers "Anal sex", “Vaginal sex”)

In the past 12 months (since in [MONTH/YEAR]), with how many different women have you had vaginal or anal sex?

M_FP12VANUM

_____

Page entry logic: This page will show when: "In the past 12 months (since [MONTH/YEAR]]), with how many different women have you had vaginal or anal sex?" is exactly equal to "1"

Sexual Behavior: Female Sex Partners (1 Partner)

You mentioned that in the past 12 months, you had sex with one female partner.

In the past 12 months (since [MONTH/YEAR]), this female partner was a:

M_F1SX

(1) Main partner (someone you felt committed to above anyone else)
(2) Casual partner (someone you didn't feel committed to or don't know very well)
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: "In the past 12 months **(**since [MONTH/YEAR]**)**, with how many different women have you had vaginal or anal sex?" is greater than "1"

Sexual Behavior: Female Sex Partners (More than 1 partner)

In the past 12 months, (since [MONTH/YEAR]), the [TOTAL NUMBER SEX PARTNERS] female partners you told us about were:

M_FTYP

(1) Only main partners (you felt committed to above anyone else)
(2) Only casual partners (you didn't feel committed to or don't know very well)
(3) Both main and casual partners
(7) I prefer not to answer
(9) Don't know

Sexual Behavior: Male Sex Partners, 2

The next questions are about having sex with men. Oral sex means he put his mouth on your penis or you put your mouth on his penis. Anal sex means you put your penis in his anus (butt) or he put his penis in your anus (butt). Rimming means he put his mouth or tongue on your anus (butt) or you put your mouth or tongue on his anus (butt).

In the past 12 months (since in [MONTH/YEAR]), what types of sex have you had with other men?

[ ] Oral sex **MSMP12M_ORAL**
[ ] Anal sex **MSMP12M_ANAL**

[ ] Rimming **MSMP12M_RIM**
[ ] Some other type of sex **MSMP12M_OTHER**
[ ] I have not had any type of sex with a man in the past 12 months **MSMP12M_NONE**
[ ] I prefer not to answer **MSMP12M_REFUSE**
[ ] Don't know **MSMP12M_DK**

Logic: "In the past 12 months (since in [MONTH/YEAR]), what types of sex have you had with other men?" is one of the following answers ("Some other type of sex")

Please specify other type of sex:

MSMP12M_OTHER_SPEC

_____

Page entry logic: This page will show when: "**In the past 12 months** (since [MONTH/YEAR]), what types of sex have you had with other men?" is one of the following answers ("Oral sex", "Anal sex", "Rimming")

Male sex partners: positioning

The next questions are about having sex with men. Oral sex means he put his mouth on your penis or you put your mouth on his penis. Anal sex means you put your penis in his anus (butt) or he put his penis in your anus (butt). Rimming means he put his mouth or tongue or your anus (butt) or you put your mouth or tongue on his anus (butt).

Now we will ask you to give some more detail about the sex you had with other men in the past 12 months. Please choose all statements that apply to you.

In the past 12 months (since in [MONTH/YEAR]):

[ ] I had anal sex as a top, i.e. I put my penis in someone else's anus (butt) **MSMP12MPOS_IAS**
[ ] I had anal sex as a bottom, i.e. someone put his penis in my anus (butt) **MSMP12MPOS_RAS**
[ ] I performed oral sex on someone **MSMP12MPOS_IOS**
[ ] Someone performed oral sex on me **MSMP12MPOS_ROS**
[ ] I rimmed someone **MSMP12MPOS_RIMACT**

[ ] Someone rimmed me	**MSMP12MPOS_RIMPAS**
[ ] I prefer not to answer	**MSMP12M_REF**
[ ] Don't know	**MSMP12M_DK**

Page entry logic: This page will show when: "**In the past 12 months** (since [MONTH/YEAR]), what types of sex have you had with other men?" is one of the following answers ("Oral sex","Anal sex")

Sex partner number

Logic: (((In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Anal sex") OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Anal sex", "Some other type of sex")) OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Anal sex", "Rimming")) OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Anal sex", "Rimming", "Some other type of sex"))

In the past 12 months, with how many different men have you had oral or anal sex?

M_MP12OANUM

_____

Logic: ((("In the past 12 months (since in [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Anal sex") OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Anal sex", "Some other type of sex")) OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Anal sex", "Rimming")) OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Anal sex", "Rimming", "Some other type of sex"))

In the past 12 months, with how many different men have you had <u>anal</u> sex?

M_MP12ANUM

_____

Logic: ((("In the past 12 months (since in [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex") OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Some other type of sex")) OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Rimming")) OR "In the past 12 months (since [MONTH/YEAR]), what types of sex have you had with other men?" is exactly equal to ("Oral sex", "Rimming", "Some other type of sex"))

In the past 12 months, with how many different men have you had <u>oral</u> sex?

M_MP12ONUM

_____

Page entry logic: This page will show when: "**In the past 12 months,** with how many different men have you had oral **or** anal sex?" is greater than "1"

Sexual Behavior: Male Sex Partners, 3

Of the [NUMBER OF] men you had oral or anal sex with in the past 12 months, how many of them did you have <u>anal</u> sex with?

M_MP12MANUM

_____

Page entry logic: This page will show when: "**In the past 12 months** (since in [MONTH/YEAR]), what types of sex have you had with other men?" is one of the following answers ("Anal sex")

Sexual Behavior: Condom Use

In the past 12 months, did you have anal sex <u>without using a condom</u>?

M_M1UAS

(0) No
(1) Yes
(7) I prefer not to answer

(9) Don't know

Page entry logic: This page will show when: "**In the past 12 months (**since in [MONTH/YEAR]**)**, with how many different men have you had **anal** sex?" is greater than "1" OR "Of the [MONTH/YEAR] men you had oral or anal sex with **in the past 12 months**, how many of them did you have **anal** sex with?" is greater than "1") AND "**In the past 12 months**, did you have anal sex **without using a condom**?" is one of the following answers ("Yes"))

Sexual Behavior: Condom Use, 2

Logic: "In the past 12 months (since in [MONTH/YEAR]), with how many different men have you had anal sex?" is greater than "1"

In the past 12 months, with how many of the [NUMBER OF ANAL SEX PARTNERS] male anal sex partners did you have anal sex without using a condom?

M_M1UASNUM1

_____

Logic: "Of the [NUMBER OF] men you had oral or anal sex with in the past 12 months (since in [MONTH/YEAR]), how many of them did you have anal sex with?" is greater than "1"

In the past 12 months, with how many of the [NUMBER OF ANAL SEX PARTNERS] male anal sex partners did you have anal sex without using a condom?

M_M1UASNUM2

_____

Page entry logic: This page will show when: "**In the past 12 months (**since [MONTH/YEAR]**)**, with how many different men have you had oral **or** anal sex?" is exactly equal to "1" OR "**In the past 12 months**, with how many different men have you had **anal** sex?" is exactly equal to "1") OR "**In the past 12 months**, with how many different men have you had **oral** sex?" is exactly equal to "1")

Sexual Behavior: Male Sex Partners (1 Partner)

You mentioned that in the past 12 months, you had sex with one male partner.

In the past 12 months (since [MONTH/YEAR]), this male partner was a:

M_M1SX

(1) Main partner (someone you felt committed to above anyone else)
(2) Casual partner (someone you didn't feel committed to or don't know very well)
(7) I prefer not to answer
(9) Don't know

As far as you know, during the time you were having a sexual relationship with your sexual partner, did he have sex with other people? Would you say he:

M_MLPOL1

(0) Definitely did not
(1) Probably did not
(2) Probably did
(3) Definitely did
(7) I prefer not to answer
(9) Don't know

Did you know his HIV status?

M_MM1HSK

(0) No
(1) Yes
(7) I prefer not to answer

Logic: "Did you know his HIV status?" is one of the following answers ("Yes")

What was his HIV status?

M_M1HST

(1) HIV-negative
(2) HIV-positive

(3) Indeterminate
(7) I prefer not to answer

Logic: "What was his HIV status?" is one of the following answers ("HIV-negative")

As far as you know, was he taking pre-exposure prophylaxis (PrEP or Truvada) to prevent HIV infection?

M_M1_PREP

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "What was his HIV status?" is one of the following answers ("HIV-positive")

As far as you know, was he taking HIV medications (antiretrovirals) to treat his HIV infection? Some men will say that they are "undetectable" when taking HIV medications.

M_M1_ART

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: "**In the past 12 months (**since in [MONTH/YEAR]**)**, with how many different men have you had oral **or** anal sex?" is greater than "1" OR "**In the past 12 months (**since in [MONTH/YEAR]**)**, with how many different men have you had **anal** sex?" is greater than "1") OR "**In the past 12 months**, since in [MONTH/YEAR], with how many different men have you had **oral** sex?" is greater than "1")

Sexual Behavior: Male Sex Partners (>1)

In the past 12 months, the [TOTAL NUMBER SEX PARTNERS] male partners you told us about were:

M_MTYP

(1) Only main partners (you felt committed to above anyone else)
(2) Only casual partners (you didn't feel committed to or don't know very well)
(3) Both main and casual partners

(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom?" is one of the following answers ("Yes")

In the past 12 months, did you have anal sex without using a condom with a man whose HIV status you did not know?

M_MUAUHS

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months, (since [MONTH/YEAR]), the [TOTAL NUMBER SEX PARTNERS] male partners you told us about were:" is one of the following answers ("Both main and casual partners") AND "In the past 12 months, did you have anal sex without using a condom with a man whose HIV status you did not know?" is one of the following answers ("Yes"))

Was this with a main or casual partner?

M_MUAUHS_TYP

(1) Main partner
(2) Casual partner
(3) Both main and casual partners
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom?" is one of the following answers ("Yes")

In the past 12 months, did you have anal sex without using a condom with a man who was HIV positive?

M_MUAHP

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), the [TOTAL NUMBER SEX PARTNERS] male partners you told us about were:" is one of the following answers ("Both main and casual partners") AND "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom with a man who was HIV positive?" is one of the following answers ("Yes"))

Was this with a main or casual partner?

M_MUAHP_TYP

(1) Main partner
(2) Casual partner
(3) Both main and casual partners
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom with a man who was HIV positive?" is one of the following answers ("Yes")

As far as you know, were these partners taking HIV medications (antiretrovirals) to treat their HIV-infection? Some men will say that they are "undetectable" when taking HIV medications.

M_M2_ART

(0) No
(1) Yes
(2) Some yes, some no
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom?" is one of the following answers ("Yes")

In the past 12 months, did you have anal sex without using a condom with a man who was HIV negative?

M_MUAHN

(0) No
(1) Yes
(7) I prefer not to answer

(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), the [TOTAL NUMBER SEX PARTNERS] male partners you told us about were:" is one of the following answers ("Both main and casual partners") AND "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom with a man who was HIV negative?" is one of the following answers ("Yes"))

Was this with a main or casual partner?

M_MUAHN_TYP

(1) Main partner
(2) Casual partner
(3) Both main and casual partners
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since [MONTH/YEAR]), did you have anal sex without using a condom with a man who was HIV negative?" is one of the following answers ("Yes")

As far as you know, were these partners taking pre-exposure prophylaxis (PrEP or Truvada) to prevent HIV infection?

M_M2_PREP

(0) No
(1) Yes
(2) Some yes, some no
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: "**In the past 12 months (since [MONTH/YEAR]),** what types of sex have you had with other men?" is one of the following answers ("Oral sex", "Anal sex")

Sexual Behavior: Social Habits

In the past 12 months, have you exchanged things like money or drugs for sex with a male partner? Check all that apply.

[ ] No **M_MEXCHANGEP12_1**

[ ] Yes, I gave a sex partner things like drugs or money for sex **M_MEXCHANGEP12_2**
[ ] Yes, a sex partner gave me things like drugs or money for sex **M_MEXCHANGEP12_3**
[ ] I prefer not to answer **M_MEXCHANGEP12_4**
[ ] Don't know **M_MEXCHANGEP12_5**

In the past 12 months, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply.

[ ] Social network websites (such as Facebook) **M_MINT_1**
[ ] Dating websites directed towards gay men **M_MINT_2**
[ ] Mobile phone apps (such as gay chat, dating and hookup apps) **M_MINT_3**
[ ] None of the above **M_MINT_4**
[ ] I prefer not to answer **M_MINT_7**
[ ] Don't know **M_MINT_9**

HIV Testing

Have you ever been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS.

EVERTEST

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Have you ever been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

In the past 2 years (since [MONTH/YEAR] of 2017), how many times have you been tested for HIV?

TEST2YRS

_____

Logic: "Have you ever been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

Have you ever used an at-home HIV test?

ATHOMEKIT

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Have you <u>ever</u> been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

When did you have your most recent HIV test?
If you don't know the exact month, please enter your best guess.

RCNTSTMONTH

Month:
(01) January
(02) February
(03) March
(04) April
(05) May
(06) June
(07) July
(08) August
(09) September
(10) October
(11) November
(12) December

RCNTSTYEAR

Year: _____

Page entry logic: This page will show when: "Have you **<u>ever</u>** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

HIV Testing

Logic: ("Year:" OR ("Month:" AND "Year:" is exactly equal to "2017"))

Have you had an HIV test in the past 12 months (since [MONTH/YEAR])?

TSTP12M

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Have you ever been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

When you most recently got tested in [MONTH/YEAR], where did you get tested?

LOCHIV_T

(01) Private doctor's office
(02) HIV counseling and testing site
(03) Public health clinic/community health clinic
(04) Street outreach program/mobile unit
(05) Sexually transmitted disease clinic
(06) Hospital (inpatient)
(07) Correctional facility (jail or prison)
(08) Emergency room
(09) At home
(10) Other
(77) I prefer not to answer
(99) Don't know

Page entry logic: This page will show when: "Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

HIV Status

Logic: "Have you ever been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("Yes")

What was the result of your most recent HIV test in [MONTH/YEAR]?

RCNTRSLT

(1) Negative

(2) Positive
(3) Never obtained results
(4) Indeterminate
(7) I prefer not to answer
(9) Don't know

Logic: "What was the result of your most recent HIV test in [MONTH/YEAR] ?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know")

Before your most recent test in [MONTH/YEAR], did you <u>ever</u> test positive for HIV?

EVRPOS

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "What was the result of your most recent HIV test in [MONTH/YEAR]?" is one of the following answers ("Positive")

Was your most recent test in [MONTH/YEAR] your first positive test?

RCNFRST

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Was your most recent test in [MONTH/YEAR] your first positive test?" is one of the following answers ("No") OR "Before your most recent test in [MONTH/YEAR], did you <u>ever</u> test positive for HIV?" is one of the following answers ("Yes"))

When did you first test positive?

POS1STMONTH

Month

(1) January
(2) February
(3) March

(4) April
(5) May
(6) June
(7) July
(8) August
(9) September
(10) October
(11) November
(12) December

POS1STYEAR
Year: _____

Page entry logic: This page will show when: ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Positive") OR "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is one of the following answers ("Yes"))

HIV Positive

In the past 12 months, have you seen a doctor, nurse, or other healthcare provider for HIV medical care?

HIVCARE_P12M

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months, have you seen a doctor, nurse, or other health care provider for HIV medical care?" is one of the following answers ("Yes")

In the past 12 months, when you saw a health care provider for HIV medical care, was your appointment with that provider in person or by video or phone? Please choose all that apply.

[ ] In person	**HIVAPPT_PERS**
[ ] By video or phone	**HIVAPPT_REMOTE**
[ ] I prefer not to answer	**HIVAPPT_DTA**
[ ] Don’t know	**HIVAPPT_DK**

Logic: ("What was the result of your most recent HIV test in [MONTH/YEAR]?" is one of the following answers ("Positive") OR "Before your most recent test in [MONTH/YEAR], did you ever test positive for HIV?" is one of the following answers ("Yes"))

Are you currently taking antiretroviral medicines to treat your HIV infection?

CURRAMED

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Are you currently taking antiretroviral medicines to treat your HIV infection?" is one of the following answers ("No")

What is the main reason you are not currently taking any antiretroviral medicines?

WHNOMEDS

(0) Not currently going to a health care provider for my HIV
(1) CD4 count and viral load are good
(2) Don't have money or insurance for antiretroviral medicines
(3) Don't want to take antiretroviral medicines
(4) Other
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: (("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Positive") OR "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is one of the following answers ("Yes")) AND ("What country were you born in?" is one of the following answers ("Afghanistan", "Albania", "Algeria", "Andorra"," Angola", "Antigua" and Barbuda", "Argentina", "Armenia", "Australia", "Austria", "Azerbaijan", "Bahamas", "Bahrain", "Bangladesh", "Barbados", "Belarus", "Belgium", "Belize", "Benin", "Bermuda", "Bhutan", "Bolivia", "Bosnia and Herzegovina", "Botswana", "Brazil", "Brunei", "Bulgaria", "Burkina Faso", "Burundi", "Cambodia", "Cameroon", "Canada", "Cape Verde", "Central African Republic", "Chad", "Chile", "China", "Colombia", "Comoros", "Congo, Democratic Republic of the", "Congo, Republic of the", "Costa Rica", "Cote d'Ivoire", "Croatia", "Cuba", "Curacao", "Cyprus", "Czech Republic", "Denmark", "Djibouti", "Dominica", "Dominican Republic", "East Timor", "Ecuador", "Egypt", "El Salvador", "Equatorial Guinea", "Eritrea", "Estonia", "Ethiopia", "Fiji", "Finland", "France", "Gabon", "Gambia", "Georgia", "Germany", "Ghana", "Greece", "Grenada", "Guatemala", "Guinea", "Guinea-Bissau", "Guyana", "Haiti", "Holy See (Vatican)", "Honduras", "Hong Kong", "Hungary", "Iceland", "India", "Indonesia", "Iran",

"Iraq", "Ireland", "Israel", "Italy", "Jamaica", "Japan", "Jordan", "Kazakhstan", "Kenya", "Kiribati", "Kosovo", "Kuwait", "Kyrgyzstan", "Laos", "Latvia", "Lebanon", "Lesotho", "Liberia", "Libya", "Liechtenstein", "Lithuania", "Luxembourg", "Macau", "Macedonia", "Madagascar", "Malawi", "Malaysia", "Maldives", "Mali", "Malta", "Marshall Islands", "Mauritania", "Mauritius", "Mexico", "Micronesia", "Moldova", "Monaco", "Mongolia", "Montenegro", "Morocco", "Mozambique", "Myanmar", "Namibia", "Nauru", "Nepal", "Netherlands", "Netherlands Antilles", "New Zealand", "Nicaragua", "Niger", "Nigeria", "North Korea", "Norway", "Oman", "Pakistan", "Palau", "Palestinian Territories", "Panama", "Papua New Guinea", "Paraguay", "Peru", "Philippines", "Poland", "Portugal", "Qatar", "Romania", "Russia", "Rwanda", "Saint Kitts and Nevis", "Saint Lucia", "Saint Vincent and the Grenadines", "Samoa", "San Marino", "Sao Tome and Principe", "Saudi Arabia", "Senegal", "Serbia", "Seychelles", "Sierra Leone", "Singapore", "Slovakia", "Slovenia", "Solomon Islands", "Somalia", "South Africa", "South Korea", "South Sudan", "Spain", "Sri Lanka", "Sudan", "Suriname", "Swaziland", "Sweden", "Switzerland", "Syria", "Taiwan", "Tajikistan", "Tanzania", "Thailand", "Timor-Leste", "Togo", "Tonga", "Trinidad and Tobago", "Tunisia", "Turkey", "Turkmenistan", "Tuvalu", "Uganda", "Ukraine", "United Arab Emirates", "United Kingdom", "Uruguay", "Uzbekistan", "Vanuatu", "Venezuela", "Vietnam", "Yemen", "Zambia", "Zimbabwe") OR "What is your primary language?" is one of the following answers ("Spanish", "Another language")))

HIV Positive: Non-US

You told us earlier that you were born outside of the United States.

Did you receive your first positive HIV test before or after you arrived in the United States to live?

HIVPOS_US

(0) Before coming to the US
(1) After coming to the US
(7) I prefer not to answer
(9) Don't know

Logic: "Did you receive your first positive HIV test before or after you arrived in the United States to live?" is one of the following answers ("Before coming to the US")

Were you taking HIV medicines before arriving in the United States to live?

NONUSMEDS

(0) No
(1) Yes

(7) I prefer not to answer
(9) Don't know

Have you experienced any of the following barriers to HIV care or taking HIV medicines in the U.S.? Check all that apply.

[ ] Health care provider doesn't speak my language	**BARRIER_POSA**
[ ] Pharmacist doesn't speak my language	**BARRIER_POS B**
[ ] I didn't have access to an interpreter	**BARRIER_POSC**
[ ] I was worried that an interpreter might disclose my HIV status or sexual orientation to others in my community	**BARRIER_POSD**
[ ] I was worried that a health care provider would share my information with law or immigration enforcement	**BARRIER_POSE**
[ ] I was worried that a health care provider would discriminate against me because of my sexual orientation or gender identity	**BARRIER_POSF**
[ ] I was worried that a health care provider would discriminate against me because of my race/ethnicity	**BARRIER_POSG**
[ ] I was worried that a healthcare provider would discriminate against me because of my country of origin	**BARRIER_POSH**
[ ] Health care provider doesn't understand my culture	**BARRIER_POSI**
[ ] I don't have insurance	**BARRIER_POSJ**
[ ] None of the above	**BARRIER_POSOTH**
[ ] I prefer not to answer	**BARRIER_POSREF**
[ ] Don't know	**BARRIER_POSDK**

Page entry logic: This page will show when: ("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative","Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know") AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is not one of the following answers ("Yes")))

PrEP Module

Pre-Exposure prophylaxis (PrEP) is taking an antiretroviral pill, also called Truvada or Descovy, every day for months or years to reduce a person's chance of getting HIV.

Before today, have you ever heard of people who do not have HIV taking PrEP, the antiretroviral medicine taken every day for months or years to reduce the risk of getting HIV?

ANTRPREV1

(0) No
(1) Yes

Page entry logic: This page will show when: "**Before today**, have you **ever** heard of people who do not have HIV taking PrEP, the antiretroviral medicine taken every day for months or years to reduce the risk of getting HIV?" is one of the following answers ("Yes")

PrEP Discussion with HCP

Pre-Exposure prophylaxis (PrEP) is taking an antiretroviral pill, also called Truvada or Descovy, every day for months or years to reduce a person's chance of getting HIV.

In the past 12 months (since [MONTH/YEAR]), have you had a discussion with a health care provider about taking PrEP?

PREP_DISCUSSED

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: "**Before today**, have you **ever** heard of people who do not have HIV taking PrEP, the antiretroviral medicine taken every day for months or years to reduce the risk of getting HIV?" is one of the following answers ("Yes")

PrEP Use

In the past 12 months (since [MONTH/YEAR]), have you taken PrEP?

PREP_USED

(0) No

(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since in [MONTH/YEAR]), have you taken PrEP?" is one of the following answers ("No", "I prefer not to answer", "Don't know")

Have you ever taken PrEP?

PREP_EVER

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months (since in [MONTH/YEAR]), have you taken PrEP?" is one of the following answers ("Yes")

Which of the following people or places describe how you got PrEP during the last 12 months? Check all that apply.

[ ] Prescription from a healthcare provider	**PREPSOURCE_PRES**
[ ] Directly from a healthcare provider or clinic	**PREPSOURCE_HCP**
[ ] A friend or relative	**PREPSOURCE_FRIEND**
[ ] A person you had/have sex with	**PREPSOURCE_SEX**
[ ] Health department	**PREPSOURCE_HD**
[ ] Online	**PREPSOURCE_ONLINE**
[ ] Some other source	**PREPSOURCE_OTH**
[ ] I prefer not to answer	**PREPSOURCE_REF**
[ ] Don't know	**PREPSOURCE_DK**

Logic: "Which of the following people or places describe how you got PrEP during the last 12 months? Check all that apply." is one of the following answers ("Some other source")

What was that other source for PrEP?

PREPSOURCE_OTHSPEC

_____

Page entry logic: This page will show when: "**In the past 12 months** (since in [MONTH/YEAR]), have you taken PrEP?" is one of the following answers ("Yes")

Current PrEP Use

Are you currently taking PrEP?

PREP_CURRENT

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Are you currently taking PrEP?" is one of the following answers ("Yes")

Which PrEP prescription medication are you currently taking?

CURRENT_PREP_RX

(1) Truvada
(2) Descovy
(7) I prefer not to answer
(9) Don’t know

Logic: "Are you currently taking PrEP?" is one of the following answers ("Yes")

In the last 30 days, about how many doses of PrEP did you take?

PREP_DOSES

(1) Less than 15
(2) 16-29
(3) 30

Logic: "Are you currently taking PrEP?" is one of the following answers ("Yes")

How many months in a row have you been taking PrEP?

PREP_MONTHS

(1) Less than 2 months
(2) 2 to 6 months

(3) 7 to 12 months
(4) 12 months or more
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: (("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know") AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is not one of the following answers ("Yes"))) AND "**In the past 12 months** (since in [MONTH/YEAR]), have you taken PrEP?" is not one of the following answers ("Yes"))

PrEP willingness

PrEP stands for pre-exposure prophylaxis. It involves a healthy person taking a pill used to treat HIV in order to prevent being infected with HIV. The pills have to be taken once a day, every day. Some people who take these pills experience side effects. These may include nausea and weight loss, which usually go away after the first month. In rare cases, taking the pill for long periods may damage the kidneys. The medication is prescribed by a doctor. Taking this medication provides only partial protection against HIV infection. So, a person on the medication should still practice other HIV prevention strategies like using condoms every time. For people who take the pill every day, studies have shown that it provides up to 90% protection against HIV infection.

Would you be willing to take anti-HIV medicines every day to lower your chances of getting HIV?

WANTHIVD

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Screening for PrEP includes answering questions about your sexual behaviors and being tested for HIV and sexually transmitted infections.

Would you be willing to be screened for PrEP in a private area in a pharmacy?

PHARMA_PREP_SCREEN

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Screening for PrEP includes answering questions about your sexual behaviors and being tested for HIV and sexually transmitted infections.

Would you be willing to be screened for PrEP in a private area in a pharmacy?" is one of the following answers ("No")

What is your main concern with being screened for PrEP in a private area in a pharmacy?

WHY_NO_PHARM_SCREEN

(1) Costs associated with PrEP
(2) Lack of privacy from pharmacy staff
(3) Inconvenient to get to a pharmacy
(4) Would prefer to be in a doctor's office
(5) Other (Please specify)

Are you comfortable speaking to a pharmacist or pharmacy staff about getting PrEP?

PREP_PHARM_COMFORT

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Are you comfortable speaking to a pharmacist or pharmacy staff about getting PrEP?" is one of the following answers ("No")

What is your main barrier to speaking to a pharmacy staff member about getting PrEP?

PREP_PHARM_DISCOMFORT

(1) Discomfort discussing sexual health with pharmacy staff
(2) Uncertain about pharmacy staff knowledge
(3) Don't want to discuss PrEP with anyone

(4) Would prefer to speak to a doctor
(5) I don't trust pharmacy staff
(6) Privacy
(7) Inconvenient to get to a pharmacy
(8) Other (Please specify)

Page entry logic: This page will show when: ("Are you currently taking PrEP?" is one of the following answers ("No") OR "Have you ever taken PrEP?" is one of the following answers ("Yes"))

PrEP Use Discontinued

Which of the following describes the reason(s) why you stopped using PrEP the last time you were on it? Choose all that apply.

[ ] The cost was too high **PREPSTOP_REASON1**
[ ] I lost my job and/or insurance **PREPSTOP_REASON2**
[ ] I experienced and/or was concerned about side-effects **PREPSTOP_REASON3**
[ ] I could not remember to take the pill every day **PREPSTOP_REASON4**
[ ] I started a monogamous relationship with an HIV-negative partner **PREPSTOP_REASON5**
[ ] I stopped being sexually active **PREPSTOP_REASON6**
[ ] I prefer to use other methods to protect myself from HIV **PREPSTOP_REASON7**
[ ] I was worried that people will think that I have HIV when they see me taking the pill **PREPSTOP_REASON10**
[ ] I was worried that people will know that I have sex with men or transgender people **PREPSTOP_REASON8**
[ ] I was worried people will think I am very sexually active because I am on PrEP **PREPSTOP_REASON9**
[ ] I was worried about my privacy with someone that I live with **PREPSTOP_REASON11**
[ ] I was worried about my privacy on my parent's health insurance plan **PREPSTOP_REASON12**
[ ] Another reason, please specify: _____ **PREPSTOP_REASONOTHSPEC**

Page entry logic: This page will show when: (("What is your primary language?" is one of the following answers ("Spanish", "Another language") OR "What country were you born in?" is one of the following answers ("Afghanistan", "Albania", "Algeria", "Andorra"," Angola", "Antigua" and Barbuda", "Argentina", "Armenia", "Australia", "Austria", "Azerbaijan", "Bahamas", "Bahrain", "Bangladesh", "Barbados", "Belarus", "Belgium", "Belize", "Benin", "Bermuda", "Bhutan", "Bolivia", "Bosnia and Herzegovina", "Botswana", "Brazil", "Brunei", "Bulgaria", "Burkina Faso", "Burundi", "Cambodia", "Cameroon", "Canada", "Cape Verde", "Central African Republic", "Chad", "Chile", "China", "Colombia", "Comoros", "Congo, Democratic

Republic of the", "Congo, Republic of the", "Costa Rica", "Cote d'Ivoire", "Croatia", "Cuba", "Curacao", "Cyprus", "Czech Republic", "Denmark", "Djibouti", "Dominica", "Dominican Republic", "East Timor", "Ecuador", "Egypt", "El Salvador", "Equatorial Guinea", "Eritrea", "Estonia", "Ethiopia", "Fiji", "Finland", "France", "Gabon", "Gambia", "Georgia", "Germany", "Ghana", "Greece", "Grenada", "Guatemala", "Guinea", "Guinea-Bissau", "Guyana", "Haiti", "Holy See (Vatican)", "Honduras", "Hong Kong", "Hungary", "Iceland", "India", "Indonesia", "Iran", "Iraq", "Ireland", "Israel", "Italy", "Jamaica", "Japan", "Jordan", "Kazakhstan", "Kenya", "Kiribati", "Kosovo", "Kuwait", "Kyrgyzstan", "Laos", "Latvia", "Lebanon", "Lesotho", "Liberia", "Libya", "Liechtenstein", "Lithuania", "Luxembourg", "Macau", "Macedonia", "Madagascar", "Malawi", "Malaysia", "Maldives", "Mali", "Malta", "Marshall Islands", "Mauritania", "Mauritius", "Mexico", "Micronesia", "Moldova", "Monaco", "Mongolia", "Montenegro", "Morocco", "Mozambique", "Myanmar", "Namibia", "Nauru", "Nepal", "Netherlands", "Netherlands Antilles", "New Zealand", "Nicaragua", "Niger", "Nigeria", "North Korea", "Norway", "Oman", "Pakistan", "Palau", "Palestinian Territories", "Panama", "Papua New Guinea", "Paraguay", "Peru", "Philippines", "Poland", "Portugal", "Qatar", "Romania", "Russia", "Rwanda", "Saint Kitts and Nevis", "Saint Lucia", "Saint Vincent and the Grenadines", "Samoa", "San Marino", "Sao Tome and Principe", "Saudi Arabia", "Senegal", "Serbia", "Seychelles", "Sierra Leone", "Singapore", "Slovakia", "Slovenia", "Solomon Islands", "Somalia", "South Africa", "South Korea", "South Sudan", "Spain", "Sri Lanka", "Sudan", "Suriname", "Swaziland", "Sweden", "Switzerland", "Syria", "Taiwan", "Tajikistan", "Tanzania", "Thailand", "Timor-Leste", "Togo", "Tonga", "Trinidad and Tobago", "Tunisia", "Turkey", "Turkmenistan", "Tuvalu", "Uganda", "Ukraine", "United Arab Emirates", "United Kingdom", "Uruguay", "Uzbekistan", "Vanuatu", "Venezuela", "Vietnam", "Yemen", "Zambia", "Zimbabwe")) AND (("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR "What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know")) AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is not one of the following answers ("Yes")))

Barriers to HIV Prevention Services

In the United States, have you experienced any of the following barriers to getting HIV prevention services, such as HIV testing, PrEP, or PEP? Check all that apply.

[ ] Health care provider doesn't speak my language **BARRIER_NEGA**
[ ] Pharmacist doesn't speak my language **BARRIER_NEGB**
[ ] I didn't have access to an interpreter **BARRIER_NEGC**
[ ] I was worried that an interpreter might disclose my HIV status or sexual orientation to others in my community **BARRIER_NEGD**
[ ] I was worried that a health care provider would share my information with law or immigration enforcement **BARRIER_NEGE**
[ ] I was worried that a health care provider would discriminate against me because of my sexual orientation or gender identity **BARRIER_NEGF**

[ ] I was worried that a health care provider would discriminate against me because of my race/ethnicity **BARRIER_NEGG**
[ ] I was worried that a health care provider would discriminate against me because of my country of origin **BARRIER_NEGH**
[ ] Health care provider doesn't understand my culture **BARRIER_NEGI**
[ ] I don't have insurance **BARRIER_NEGJ**
[ ] None of the above **BARRIER_NEGOTH**
[ ] I prefer not to answer **BARRIER_NEGREF**
[ ] Don't know **BARRIER_NEGDK**

HPV & HBV Vaccines

Logic: Variable GROUPB is exactly equal to "1"

A vaccine to prevent human papillomavirus (HPV) infection is available and is called the HPV shot, cervical cancer vaccine, GARDASIL, or CERVARIX.

Have you ever received the HPV vaccine?

HPVSHOT

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "A vaccine to prevent human papillomavirus (HPV) infection is available and is called the HPV shot, cervical cancer vaccine, GARDASIL, or CERVARIX.

Have you ever received the HPV vaccine?" is one of the following answers ("Yes")

How many shots of the HPV vaccine did you receive?

DOSES_HPVSHOT

(1) 1
(2) 2
(3) 3
(7) I prefer not to answer
(9) Don't know

Logic: Variable GROUPB is exactly equal to "1"

Have you ever received the hepatitis B vaccine?

HBVSHOT

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "Have you ever received the hepatitis B vaccine?" is one of the following answers ("Yes")

How many shots of the HBV vaccine did you receive?

DOSES_HBVSHOT

(1) 1
(2) 2
(3) 3
(7) I prefer not to answer
(9) Don't know

PTSD

Sometimes things happen to people that are very upsetting and stressful, like being in a life-threatening situation, such as a flood, earthquake, or other major disaster or extreme weather event; being involved in a serious accident or fire; being physically abused, assaulted, or mugged; being sexually abused, assaulted, or harassed; being incarcerated in jail or prison; being harassed by police; seeing another person killed or dead; someone making a threat to harm you; having a serious medical emergency or being diagnosed with a chronic illness, like HIV; seeing another person injured or badly hurt; having someone close to you suddenly die; or hearing about something horrible that has happened to someone you are close to.

Have you ever experienced something like the situations described above?

PTSD_INTRO

(0) No

(1) Yes

(7) I prefer not to answer

(9) Don't know

Logic: Hidden unless "Have you ever experienced something like the situations described above?" is one of the following answers ("Yes")

In the past month, how much were you bothered by the following:

	Not at all	**A little bit**	**Moderately**	**Quite a bit**	**Extremely**
Repeated, disturbing, and unwanted memories of the stressful experience? **var1894**	(0)	(1)	(2)	(3)	(4)
Feeling very upset when something reminded you of the stressful experience? **var1895**	(0)	(1)	(2)	(3)	(4)
Avoiding memories, thoughts, or feelings related to the stressful experience? **var1896**	(0)	(1)	(2)	(3)	(4)
Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)? **var1897**	(0)	(1)	(2)	(3)	(4)
Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong	(0)	(1)	(2)	(3)	(4)

with me, no one can be trusted, the world is completely dangerous)? **var1898**					
Loss of interest in activities that you used to enjoy? **var1899**	(0)	(1)	(2)	(3)	(4)
Trouble experiencing positive feelings (for example, being unable to feel happiness or having loving feelings for people close to you)? **var1900**	(0)	(1)	(2)	(3)	(4)
Feeling jumpy or easily startled? **var1901**	(0)	(1)	(2)	(3)	(4)
Having difficulty concentrating? **var1902**	(0)	(1)	(2)	(3)	(4)

Social Capital Scale

Now we will ask you some questions about your social life and your relationships with gay, bisexual and other men who have sex with men. For each statement below, please tell us if you strongly agree, mostly agree, mostly disagree, or strongly disagree.

	Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**I prefer not to answer**	**Don't know**
You can count on other gay/bisexual men if you need to borrow money. **SOCCAP_MSM1**	(1)	(2)	(3)	(4)	(5)	(7)	(9)

You can count on other gay/bisexual men to accompany you to the doctor or hospital. **SOCCAP_MSM2**	(1)	(2)	(3)	(4)	(5)	(7)	(9)
You can count on other gay/bisexual men if you need to talk about your problems. **SOCCAP_MSM3**	(1)	(2)	(3)	(4)	(5)	(7)	(9)
You can count on other gay/bisexual men if you need somewhere to stay. **SOCCAP_MSM4**	(1)	(2)	(3)	(4)	(5)	(7)	(9)
The group of gay/bisexual men you know is integrated into the larger community. **SOCCAP_MSM5**	(1)	(2)	(3)	(4)	(5)	(7)	(9)
You can count on other gay/bisexual men to help you find other partners. **SOCCAP_MSM6**	(1)	(2)	(3)	(4)	(5)	(7)	(9)
You can count on other gay/bisexual men to support the use of condoms. **SOCCAP_MSM7**	(1)	(2)	(3)	(4)	(5)	(7)	(9)
You can trust the majority of other gay/bisexual men in your area. **SOCCAP_MSM8**	(1)	(2)	(3)	(4)	(5)	(7)	(9)

Social Capital Scale, cont'd

In which of the following group activities do you currently participate in your personal life? For each one please tell us if you participate, and if so, if you would consider yourself a member, active member, or group leader.

	Don't participate	Member	Active member	Group leader	I prefer not answer	Don't know
Church, mosque, synagogue or other religious groups **MEMBER1**	(0)	(1)	(2)	(3)	(7)	(9)
Clubs (sports, student groups, etc) **MEMBER2**	(0)	(1)	(2)	(3)	(7)	(9)
Cultural activities **MEMBER3**	(0)	(1)	(2)	(3)	(7)	(9)
Activities in your community **MEMBER4**	(0)	(1)	(2)	(3)	(7)	(9)

Social Capital Scale, cont'd

In the past 12 months**, how often have you participated in a meeting, march, rally, or gathering to promote the rights of gay/bisexual men?**

MSM_RALLY_FREQ

(0) Never

(1) Once

(2) A couple of time (two or three)

(3) More than three times

(7) I prefer not to answer

(9) Don't know

In the past 12 months**, how often have you joined together with other gay/bisexual men to address a common problem facing gay/bisexual men?**

MSM_SOLIDARITY_FREQ

(0) Never

(1) Once

(2) A couple of time (two or three)

(3) More than three times

(7) I prefer not to answer

(9) Don't know

How often do you get the social and emotional support you need?

SUPPORT_FREQ

(0) Never

(1) Almost never

(2) Sometimes

(3) Almost always

(4) Always

(7) I prefer not to answer

(9) Don't know

Social Capital Scale, cont'd

Approximately how many times in the past 12 months **have you had gay/bisexual friends over to your home?**

SOCIAL_MSM_FREQ

(0) Never

(1) Less than once a month

(2) Once a month on average

(3) Twice a month on average

(4) Three times a month on average

(5) Once per week on average

(6) More than once per week on average

(7) I prefer not to answer

(9) Don’t know

Approximately how many friends do you have who are gay/bisexual men?

NUMMSMFRIENDS

Stigma

The next set of questions is about whether experiences happened ever in your life, and if so, whether they happened in the past 6 months (since in [MONTH/YEAR]).

Have you ever felt excluded from family activities because you have sex with men?

STIGMA_A1

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Have you ever felt that family members have made discriminatory remarks or gossiped about you because you have sex with men?

STIGMA_A2

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months

(7) I prefer not to answer
(9) Don’t know

Have you ever felt rejected by your friends because you have sex with men?

STIGMA_A3

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Stigma

Have you ever felt afraid to go to health care services because you worry someone may learn you have sex with men?

STIGMA_B1

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(3) I prefer not to answer
(4) Don’t know

Have you ever avoided going to health care services because you worry someone may learn you have sex with men?

STIGMA_B2

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Have you ever heard health care providers gossiping about you (talking about you) because you have sex with men?

STIGMA_B3

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Have you ever felt that you were not treated well in a health center because someone knew that you have sex with men?

STIGMA_B4

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Stigma

Have you ever felt that the police refused to protect you because you have sex with men?

STIGMA_C1

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Have you ever felt scared to be in public places because you have sex with men?

STIGMA_C2

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Have you ever been verbally harassed and felt it was because you have sex with men?

STIGMA_C3

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(3) I prefer not to answer
(4) Don’t know

Have you ever been blackmailed by someone because you have sex with men?

STIGMA_C4

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Stigma

Has someone ever physically hurt you (pushed, shoved, slapped, hit, kicked, choked or otherwise physically hurt you)?

STIGMA_D1

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Logic: "Has someone ever physically hurt you (pushed, shoved, slapped, hit, kicked, choked or otherwise physically hurt you)? " is one of the following answers ("Yes, in the last 6 months", "Yes, but not in the last 6 months")

Do you believe any of these experiences of physical violence was/were related to the fact that you have sex with men?

STIGMA_D2

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Have you ever been forced to have sex when you did not want to?
By forced, we mean physically forced, coerced to have sex, or penetrated with an object, when you did not want to.

STIGMA_D3

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

Logic: "Have you ever been forced to have sex when you did not want to?
By forced, we mean physically forced, coerced to have sex, or penetrated with an object, when you did not want to." is one of the following answers ("Yes, in the last 6 months", "Yes, but not in the last 6 months")

Do you believe any of these experiences of sexual violence were related to the fact that you have sex with men?

STIGMA_D4

(0) No
(1) Yes, in the last 6 months
(2) Yes, but not in the last 6 months
(7) I prefer not to answer
(9) Don’t know

K-6 Mental Health Scale

The following questions ask about how you have been feeling during the past 30 days. For each question, please choose the response that best describes how often you had this feeling.

During the past 30 days, about how often did you feel...

	All of the time	Most of the time	Some of the time	A little of the time	None of the time	I prefer not to answer	Don't know
K6_NERVOUS Nervous	(1)	(2)	(3)	(4)	(5)	(7)	(9)
K6_HOPELESS Hopeless	(1)	(2)	(3)	(4)	(5)	(7)	(9)
K6_RESTLESS Restless or fidgety	(1)	(2)	(3)	(4)	(5)	(7)	(9)
K6_DEPRESSED So depressed that nothing could cheer you up	(1)	(2)	(3)	(4)	(5)	(7)	(9)
K6_EFFORT That everything was an effort	(1)	(2)	(3)	(4)	(5)	(7)	(9)
K6_WORTHLESS Worthless	(1)	(2)	(3)	(4)	(5)	(7)	(9)

Suicidality

Now we're going to ask you some questions about how you may have felt in the past 12 months, that is since [MONTH/YEAR].

At any time in the past 12 months, up to and including today, did you seriously think about trying to kill yourself?

SUICIDE_THINK

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "At any time in the past 12 months, up to and including today, did you seriously think about trying to kill yourself?" is one of the following answers ("Yes")

During the past 12 months, did you make any plans to kill yourself?

SUICIDE_PLANS

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "At any time in the past 12 months, up to and including today, did you seriously think about trying to kill yourself?" is one of the following answers ("Yes")

During the past 12 months, did you try to kill yourself?

SUICIDE_TRY

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

STI Testing

Now we're going to ask you about testing for sexually transmitted infections.

Have you <u>ever</u> been tested for the sexually transmitted infections gonorrhea, chlamydia, or syphilis?

EVERSTI_TEST

(0) No
(1) Yes

(7) I prefer not to answer
(9) Don't know

Logic: "Have you <u>ever</u> been tested for the sexually transmitted infections gonorrhea, chlamydia, or syphilis?" is one of the following answers ("Yes")

In the <u>past 12 months</u>, that is, since [MONTH/YEAR], were you tested by a doctor or other health care provider for a sexually transmitted infection like gonorrhea, chlamydia, or syphilis?

ANYSTI_TEST

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Logic: "In the past 12 months, that is, since [MONTH/YEAR], were you tested by a doctor or other health care provider for a sexually transmitted infection like gonorrhea, chlamydia, or syphilis? " is one of the following answers ("Yes")

In the <u>past 12 months</u>, when you were tested by a doctor or other health care provider for a sexually transmitted infection like gonorrhea, chlamydia, or syphilis, what samples did you provide for testing? Check all that apply.

[ ] I had my blood drawn	**STITEST_BLOOD**
[ ] I gave a urine sample	**STITEST_URINE**
[ ] I had my rectum (butt) swabbed	**STITEST_RECTUM**
[ ] I had my throat swabbed	**STITEST_THROAT**
[ ] I prefer not to answer	**STITEST_REF**
[ ] Don't know	**STITEST_DK**

Page entry logic: This page will show when: ((((("Have you **<u>ever</u>** had vaginal sex (penis in the vagina) or anal sex (penis in the butt) with a woman?" is one of the following answers ("Yes") OR "Have you **<u>ever</u>** had oral sex (mouth on the penis) with a man?" is one of the following answers ("Yes")) OR "Have you **<u>ever</u>** had anal sex (penis in the butt) with a man?" is one of the following answers ("Yes")) OR "**In the past 12 months** (since [MONTH/YEAR]), what types of sex have you had with a **woman**? (Check all that apply.)" is one of the following answers ("Vaginal sex", "Anal sex")) OR "**In the past 12 months** (since [MONTH/YEAR]), what types of sex have you had with other men?" is one of the following answers ("Oral sex", "Anal sex", "Rimming"))

Bacterial STI Diagnoses

In the past 12 months (since [MONTH/YEAR]), has a doctor, nurse or other health care provider told you that you had any of the following? Check all that apply.

[ ] Gonorrhea	**BSTIA**
[ ] Chlamydia	**BSTIB**
[ ] Syphilis	**BSTIC**
[ ] None of the above	**BSTID**
[ ] I prefer not to answer	**BSTIE**
[ ] Don't know	**BSTIF**

Pharmacy STI Testing Willingness

Would you be willing to conduct a test for sexually transmitted infections, like gonorrhea, chlamydia, or syphilis, at a pharmacy like CVS or Walgreens where you could receive your results and any necessary treatment in a single visit?

PHARM_STI_TEST

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: ("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know") AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is not one of the following answers ("Yes")))

Future HIV Infection

How likely do you think it is that you will become infected with HIV in the next 5 years?

HIVDXN5Y

(1) Very unlikely
(2) Somewhat unlikely
(3) Somewhat likely

(4) Very likely

Are you worried that you will become infected with HIV?

HIVDXWORRY

(1) Not worried at all
(2) Not worried
(3) Somewhat worried
(4) Very worried

Page entry logic: This page will show when: ("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know") AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is not one of the following answers ("Yes")))

BWS/DCE intro question

Pre-exposure prophylaxis, or PrEP, has been shown to reduce the risk of acquisition of HIV when taken as a daily pill. Researchers are working on an injectable form of PrEP that would be prescribed by a doctor and given as a shot. The shot would have to be given every couple of months to reduce the risk of getting HIV.

Before today, have you ever heard of an injectable form of PrEP that you get every couple month, as a way to reduce the risk of getting HIV?

INJ_PREP_AWARE

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

How likely would you be to use this injectable form of PrEP, if it was available, to reduce the risk of getting HIV?

INJ_PREP_LIKERT

(1) Very likely
(2) Somewhat likely
(3) Neither likely nor unlikely
(4) Somewhat unlikely
(5) Very unlikely
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: (DCE/BWS random question module (1 to 4) is exactly equal to "1" AND Never tested/HIV negative indicator is exactly equal to "1")

DCE Module #1

Now we're going to ask you some questions to better understand the characteristics of injectable PrEP that would be most desirable to potential patients. Imagine that the shot needs to be given every couple of months.

For each question below, you will be presented with two sets of hypothetical choices related to injectable PrEP. Considering all the hypothetical characteristics in each pair, choose *either* Choice A *or* Choice B, you also have the option of Choice C, meaning you would not choose either injection.

There are 14 questions like this in total.

Here are some definitions to help you to better understand the characteristics and choices:

Side effects:

- **25% chance of moderate pain at the injection site: In clinic trials of the PrEP injection, some people had mild-to-moderate pain or tenderness at the site of the shot, and it lasted 2-7 days. This is about the same as getting a flu shot or a vaccine.**
- **15% chance of a headache: In clinic trials of the PrEP injection, a small proportion of people reported headache in the couple days after they got the shot.**
- **5% chance of rash. In clinic trials of the PrEP injection, a very small proportion of people reported a mild rash, which cleared up on its own.**

Out-of-pocket cost: Fees (e.g. deductibles, coinsurance, or copayments) that you pay directly to a business in order to receive the injection. The cost listed is per shot (every couple months). For example, $100 means you pay $100 every two months to

get one shot.

Level of protection: This is the how well the PrEP injection works to prevent HIV. That is, while getting the PrEP injection, how many people out of every 1000 people are protected from getting HIV.

Total time spent obtaining PrEP: In order to get the injection, patients will need to travel to a health provider or clinic, get laboratory tests done, get the injection, and travel home again. The times listed below represent the TOTAL time spent, including travel to and from the provider's office, time waiting at the clinic, and time getting the shot itself.

CHOICE A

- **15% chance of headache**
- **Costs $30 out of pocket**
- **Protects 999 out of 1000 people**
- **Takes 1 hour total for travel, tests and injection**

CHOICE B

- **5% chance of rash**
- **Costs $50 out of pocket**
- **Protects 900 out of 1000 people**
- **Takes 2 hours total for travel, tests and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q1

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**

- **Costs $50 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $10 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q2

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $50 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q3

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q4

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $30 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $50 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q5

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $50 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q6

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q7

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $10 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $50 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q8

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q9

(1) Choice A
(2) Choice B

(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $50 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q10

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $10 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $30 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q11

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $50 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $30 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q12

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $50 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q13

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $50 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE1_Q14

(1) Choice A
(2) Choice B
(0) I choose neither

Page entry logic: This page will show when: (DCE/BWS random question module (1 to 4) is exactly equal to "2" AND Never tested/HIV negative indicator is exactly equal to "1")

DCE Module #2

Now we're going to ask you some questions to better understand the characteristics of injectable PrEP that would be most desirable to potential patients. Imagine that the shot needs to be given every couple of months.

For each question below, you will be presented with two sets of hypothetical choices related to injectable PrEP. Considering all the hypothetical characteristics in each pair, choose *either* Choice A *or* Choice B, you also have the option of Choice C, meaning you would not choose either injection.

There are 14 questions like this in total.

Here are some definitions to help you to better understand the characteristics and choices:

Side effects:

- **25% chance of moderate pain at the injection site: In clinic trials of the PrEP injection, some people had mild-to-moderate pain or tenderness at the site of the shot, and it lasted 2-7 days. This is about the same as getting a flu shot or a vaccine.**
- **15% chance of a headache: In clinic trials of the PrEP injection, a small proportion of people reported headache in the couple days after they got the shot.**
- **5% chance of rash. In clinic trials of the PrEP injection, a very small proportion of people reported a mild rash, which cleared up on its own.**

Out-of-pocket cost: Fees (e.g. deductibles, coinsurance, or copayments) that you pay directly to a business in order to receive the injection. The cost listed is per shot (every couple months). For example, $100 means you pay $100 every two months to get one shot.

Level of protection: This is the how well the PrEP injection works to prevent HIV. That is, while getting the PrEP injection, how many people out of every 1000 people are protected from getting HIV.

Total time spent obtaining PrEP: In order to get the injection, patients will need to travel to a health provider or clinic, get laboratory tests done, get the injection, and travel home again. The times listed below represent the TOTAL time spent, including travel to and from the provider's office, time waiting at the clinic, and time getting the shot itself.

CHOICE A

- **15% chance of headache**
- **Costs $30 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $75 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q1

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $75 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $10 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q2

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $75 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q3

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q4

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $30 out of pocket**
- **Protects 900 out of 1,000 people**

- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $75 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q5

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $75 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q6

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**

- **Costs $30 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q7

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $10 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $75 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q8

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q9

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $75 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **15% chance of headache**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q10

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **25% chance of pain**
- **Costs $10 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $30 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q11

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $75 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

CHOICE B

- **5% chance of rash**
- **Costs $30 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q12

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **5% chance of rash**
- **Costs $10 out of pocket**
- **Protects 999 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $75 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 3 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q13

(1) Choice A
(2) Choice B
(0) I choose neither

CHOICE A

- **15% chance of headache**
- **Costs $75 out of pocket**
- **Protects 900 out of 1,000 people**
- **Takes 1 hour total for travel, tests, and injection**

CHOICE B

- **25% chance of pain**
- **Costs $30 out of pocket**
- **Protects 950 out of 1,000 people**
- **Takes 2 hours total for travel, tests, and injection**

If both drugs were real and available to you, which would you choose?

DCE2_Q14

(1) Choice A
(2) Choice B

(0) I choose neither

Page entry logic: This page will show when: (DCE/BWS random question module (1 to 4) is exactly equal to "3" AND Never tested/HIV negative indicator is exactly equal to "1")

BWS Module # 1

Now we're going to ask you some questions to better understand the characteristics of injectable PrEP that would be most desirable to potential patients. Imagine that the shot needs to be given every couple of months.

For each question below, you will be presented with two sets of hypothetical choices related to injectable PrEP. Consider that you are talking to your doctor about the PrEP injection. Please choose the *one best thing* and the *one worst thing* about a PrEP injection for these 11 questions. We will also ask if you would take the PrEP injection.

Here are some definitions to help you to better understand the characteristics and choices:

Side effects:

- **25% chance of moderate pain at the injection site: In clinic trials of the PrEP injection, some people had mild-to-moderate pain or tenderness at the site of the shot, and it lasted 2-7 days. This is about the same as getting a flu shot or a vaccine.**
- **15% chance of a headache: In clinic trials of the PrEP injection, a small proportion of people reported headache in the couple days after they got the shot.**
- **5% chance of rash. In clinic trials of the PrEP injection, a very small proportion of people reported a mild rash, which cleared up on its own.**

Out-of-pocket cost: Fees (e.g. deductibles, coinsurance, or copayments) that you pay directly to a business in order to receive the injection. The cost listed is per shot (every couple months). For example, $100 means you pay $100 every two months to get one shot.

Level of protection: This is the how well the PrEP injection works to prevent HIV. That is, while getting the PrEP injection, how many people out of every 1000 people are protected from getting HIV.

Total time spent obtaining PrEP: In order to get the injection, patients will need to travel to a health provider or clinic, get laboratory tests done, get the injection, and travel home again. The times listed below represent the TOTAL time spent, including travel to and from the provider's office, time waiting at the clinic, and time getting the shot itself.

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **5% chance of rash**
- **$30 out-of-pocket cost**
- **Protects 999 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q1_BEST

( ) 5% chance of rash

( ) $30

( ) Protects 999 out of 1,000 people

( ) Takes 1 hour total

Worst BWS1_Q1_WORST

( ) 5% chance of rash

( ) $30

( ) Protects 999 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS1_Q1_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **5% chance of rash**
- **$10 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q2_BEST

( ) 5% chance of rash

( ) $10

( ) Protects 950 out of 1,000 people

( ) Takes 2 hours total

Worst BWS1_Q2_WORST

( ) 5% chance of rash

( ) $10

( ) Protects 950 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS1_Q2_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$10 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q3_BEST

( ) 15% chance of rash

( ) $10

( ) Protects 900 out of 1,000 people

( ) Takes 1 hour total

Worst BWS1_Q3_WORST

( ) 15% chance of rash

( ) $10

( ) Protects 900 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS1_Q3_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**
- **$10 out-of-pocket cost**
- **Protects 999 out of 1,000 people over one year**
- **Takes 3 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q4_BEST

( ) 25% chance of rash

( ) $10

( ) Protects 999 out of 1,000 people

( ) Takes 3 hours total

Worst BWS1_Q4_WORST

( ) 25% chance of rash

( ) $10

( ) Protects 999 out of 1,000 people

( ) Takes 3 hours total

If this PrEP injection was available, would you take it? BWS1_Q4_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$50 out-of-pocket cost**
- **Protects 999 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q5_BEST

( ) 15% chance of rash

( ) $50

( ) Protects 999 out of 1,000 people

( ) Takes 2 hours total

Worst BWS1_Q5_WORST

( ) 15% chance of rash

( ) $50

( ) Protects 999 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS1_Q5_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**
- **$50 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q6_BEST

( ) 25% chance of rash

( ) $50

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

Worst BWS1_Q6_WORST

( ) 25% chance of rash

( ) $50

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS1_Q6_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**

- **$30 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q7_BEST

( ) 25% chance of rash

( ) $30

( ) Protects 900 out of 1,000 people

( ) Takes 2 hours total

Worst BWS1_Q7_WORST

( ) 25% chance of rash

( ) $30

( ) Protects 900 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS1_Q7_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **5% chance of rash**
- **$50 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 3 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q8_BEST

( ) 5% chance of rash

( ) $50

( ) Protects 900 out of 1,000 people

( ) Takes 3 hours total

Worst BWS1_Q8_WORST

( ) 5% chance of rash

( ) $50

( ) Protects 900 out of 1,000 people

( ) Takes 3 hours total

If this PrEP injection was available, would you take it? BWS1_Q8_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$30 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 3 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q9_BEST

( ) 15% chance of rash

( ) $30

( ) Protects 950 out of 1,000 people

( ) Takes 3 hours total

Worst BWS1_Q9_WORST

( ) 15% chance of rash

( ) $30

( ) Protects 950 out of 1,000 people

( ) Takes 3 hours total

If this PrEP injection was available, would you take it? BWS1_Q9_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$50 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q10_BEST

( ) 15% chance of rash

( ) $50

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

Worst BWS1_Q10_WORST

( ) 15% chance of rash

( ) $50

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS1_Q10_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**
- **$30 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS1_Q11_BEST

( ) 25% chance of rash

( ) $30

( ) Protects 900 out of 1,000 people

( ) Takes 2 hours total

Worst BWS1_Q11_WORST

( ) 25% chance of rash

( ) $30

( ) Protects 900 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS1_Q11_YN

( ) Yes

( ) No

Page entry logic: This page will show when: (DCE/BWS random question module (1 to 4) is exactly equal to "4" AND Never tested/HIV negative indicator is exactly equal to "1")

BWS Module 2

Now we're going to ask you some questions to better understand the characteristics of injectable PrEP that would be most desirable to potential patients. Imagine that the shot needs to be given every couple of months.

For each question below, you will be presented with two sets of hypothetical choices related to injectable PrEP. Consider that you are talking to your doctor about the PrEP injection. Please choose the *one best thing* and the *one worst thing* about a PrEP injection for these 11 questions. We will also ask if you would take the PrEP injection.

Here are some definitions to help you to better understand the characteristics and choices:

Side effects:

- **25% chance of moderate pain at the injection site: In clinic trials of the PrEP injection, some people had mild-to-moderate pain or tenderness at the site of the shot, and it lasted 2-7 days. This is about the same as getting a flu shot or a vaccine.**
- **15% chance of a headache: In clinic trials of the PrEP injection, a small proportion of people reported headache in the couple days after they got the shot.**
- **5% chance of rash. In clinic trials of the PrEP injection, a very small proportion of people reported a mild rash, which cleared up on its own.**

Out-of-pocket cost: Fees (e.g. deductibles, coinsurance, or copayments) that you pay directly to a business in order to receive the injection. The cost listed is per shot (every couple months). For example, $100 means you pay $100 every two months to get one shot.

Level of protection: This is the how well the PrEP injection works to prevent HIV. That is, while getting the PrEP injection, how many people out of every 1000 people are protected from getting HIV.

Total time spent obtaining PrEP: In order to get the injection, patients will need to travel to a health provider or clinic, get laboratory tests done, get the injection, and travel home again. The times listed below represent the TOTAL time spent, including travel to and from the provider's office, time waiting at the clinic, and time getting the shot itself.

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **5% chance of rash**
- **$30 out-of-pocket cost**
- **Protects 999 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q1_BEST

( ) 5% chance of rash

( ) $30

( ) Protects 999 out of 1,000 people

( ) Takes 1 hour total

Worst BWS2_Q1_WORST

( ) 5% chance of rash

( ) $30

( ) Protects 999 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS2_Q1_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **5% chance of rash**
- **$10 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q2_BEST

( ) 5% chance of rash

( ) $10

( ) Protects 950 out of 1,000 people

( ) Takes 2 hours total

Worst BWS2_Q2_WORST

( ) 5% chance of rash

( ) $10

( ) Protects 950 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS2_Q2_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$10 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q3_BEST

( ) 15% chance of rash

( ) $10

( ) Protects 900 out of 1,000 people

( ) Takes 1 hour total

Worst BWS2_Q3_WORST

( ) 15% chance of rash

( ) $10

( ) Protects 900 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS2_Q3_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**
- **$10 out-of-pocket cost**
- **Protects 999 out of 1,000 people over one year**
- **Takes 3 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q4_BEST

( ) 25% chance of rash

( ) $10

( ) Protects 999 out of 1,000 people

( ) Takes 3 hours total

Worst BWS2_Q4_WORST

( ) 25% chance of rash

( ) $10

( ) Protects 999 out of 1,000 people

( ) Takes 3 hours total

If this PrEP injection was available, would you take it? BWS2_Q4_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$75 out-of-pocket cost**
- **Protects 999 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q5_BEST

( ) 15% chance of rash

( ) $75

( ) Protects 999 out of 1,000 people

( ) Takes 2 hours total

Worst BWS2_Q5_WORST

( ) 15% chance of rash

( ) $75

( ) Protects 999 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS2_Q5_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**
- **$75 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q6_BEST

( ) 25% chance of rash

( ) $75

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

Worst BWS2_Q6_WORST

( ) 25% chance of rash

( ) $75

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS2_Q6_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **25% chance of pain**
- **$30 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 2 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q7_BEST

( ) 25% chance of rash

( ) $30

( ) Protects 900 out of 1,000 people

( ) Takes 2 hours total

Worst BWS2_Q7_WORST

( ) 25% chance of rash

( ) $30

( ) Protects 900 out of 1,000 people

( ) Takes 2 hours total

If this PrEP injection was available, would you take it? BWS2_Q7_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **5% chance of rash**
- **$75 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 3 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q8_BEST

( ) 5% chance of rash

( ) $75

( ) Protects 900 out of 1,000 people

( ) Takes 3 hours total

Worst BWS2_Q8_WORST

( ) 5% chance of rash

( ) $75

( ) Protects 900 out of 1,000 people

( ) Takes 3 hours total

If this PrEP injection was available, would you take it? BWS2_Q8_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$30 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 3 hours total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q9_BEST

( ) 15% chance of rash

( ) $30

( ) Protects 950 out of 1,000 people

( ) Takes 3 hours total

Worst BWS2_Q9_WORST

( ) 15% chance of rash

( ) $30

( ) Protects 950 out of 1,000 people

( ) Takes 3 hours total

If this PrEP injection was available, would you take it? BWS2_Q9_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of rash**
- **$75 out-of-pocket cost**
- **Protects 950 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q10_BEST

( ) 15% chance of rash

( ) $75

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

Worst BWS2_Q10_WORST

( ) 15% chance of rash

( ) $75

( ) Protects 950 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS2_Q10_YN

( ) Yes

( ) No

Consider that you are talking to your doctor about getting the PrEP injection with the following attributes:

- **15% chance of headache**
- **$10 out-of-pocket cost**
- **Protects 900 out of 1,000 people over one year**
- **Takes 1 hour total for travel, tests and injection**

Out of the options below, please choose the *one best thing* about the PrEP injection and the *one worst thing* about the PrEP injection.

Best BWS2_Q11_BEST

( ) 15% chance of rash

( ) $10

( ) Protects 900 out of 1,000 people

( ) Takes 1 hour total

Worst BWS2_Q11_WORST

( ) 15% chance of rash

( ) $10

( ) Protects 900 out of 1,000 people

( ) Takes 1 hour total

If this PrEP injection was available, would you take it? BWS2_Q11_YN

( ) Yes

( ) No

Page entry logic: This page will show when: ("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate","I prefer not to answer", "Don't know") AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is not one of the following answers ("Yes")))

PrEP Pills vs Injection

Consider the following two PrEP options:

PrEP injection (choice A)

- **A shot every 2 months**
- **Some pain/tenderness at injection site, lasts 2-5 days**

- **99% effective if taken properly**
- **One clinic visits every 2 months**

PrEP pills (choice B)

- **A pill every day**
- **Small chance of mild nausea, diarrhea for first couple months**
- **90% effective if taken properly**
- **One clinic visit every 3 months**

If both drugs were real and available to you, which would you choose?

PILLSVSINJ

(1) PrEP injection (choice A)

(2) PrEP pills (choice B)

(0) I choose neither

Logic: "How likely would you be to use this injectable form of PrEP, if it was available, to reduce the risk of getting HIV?" is not one of the following answers ("Very unlikely")

If the PrEP injection were available and you were interested in receiving it, which location would you be most likely to go to get the shot?

INJ_PREP_LOC

(1) Private doctor's office

(2) Sexual health clinic

(3) HIV/AIDS clinic

(4) Community health center

(5) Health department

(6) Mobile health unit

(7) Other, please specify:: _____

(77) I prefer not to answer

(99) Don't know

Assessment of Prevention Activities

In the past 12 months, have you gotten any free condoms, not counting those given to you by a friend, relative, or sex partner?

COND12

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

In the past 12 months, have you had a one-on-one conversation with an outreach worker, counselor, or prevention program worker about ways to prevent HIV? Don't count the times where you had a conversation as part of an HIV test.

TALKHIV

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

In the past 12 months, have you been a participant in any organized session(s) involving a small group of people to discuss ways to prevent HIV? Don't include discussions you had with a group of friends.

GROUP12

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

UIC Messaging Questions

How often to do you encounter messages about HIV on social media (e.g. Facebook, Twitter, YouTube, Instagram)? By "messages about HIV", we mean any messages you encounter on social media, not just those put out by health departments.

UICMESS

(4) Very frequently
(3) Frequently
(2) Infrequently
(1) Very infrequently
(0) Never
(7) I prefer not to answer
(9) Don't know

Logic: "How often to do you encounter messages about HIV on social media (e.g. Facebook, Twitter, YouTube, Instagram)? By "messages about HIV", we mean any messages you encounter on social media, not just those put out by health departments." is one of the following answers ("Very frequently", "Frequently", "Infrequently", "Very infrequently")

How often do the messages about HIV you encounter on social media give you a clear indication of what to do about HIV prevention or testing?

UICMESSPREV

(4) Very frequently
(3) Frequently
(2) Infrequently
(1) Very infrequently
(0) Never
(7) I prefer not to answer
(9) Don't know

Logic: "How often to do you encounter messages about HIV on social media (e.g. Facebook, Twitter, YouTube, Instagram)? By "messages about HIV", we mean any messages you encounter on social media, not just those put out by health departments." is one of the following answers ("Very frequently", "Frequently", "Infrequently", "Very infrequently")

How often do the messages about HIV you encounter on social media likely to be well received by gay or bisexual men?

UICMESSMSM

(4) Very frequently
(3) Frequently
(2) Infrequently
(1) Very infrequently
(0) Never
(7) I prefer not to answer
(9) Don't know

Logic: "How often to do you encounter messages about HIV on social media (e.g. Facebook, Twitter, YouTube, Instagram)? By "messages about HIV", we mean any messages you encounter on social media, not just those put out by health departments." is one of the following answers ("Very frequently", "Frequently", "Infrequently", "Very infrequently")

How often do you share the messages about HIV you encounter on social media with your network?

UICMESSSHARE

(4) Very frequently
(3) Frequently
(2) Infrequently
(1) Very infrequently
(0) Never
(7) I prefer not to answer
(9) Don't know

UIC Advocacy Questions

How likely, if at all, would you be to sign a petition to a representative (e.g. elected or appointed official) to express support for a policy to expand the budget available for offering free sterile needles and syringes in your area?

UICADVNDLE

(3) Very likely
(2) Somewhat likely
(1) Somewhat unlikely
(0) Very unlikely
(7) I prefer not to answer
(9) Don't know

How likely, if at all, would you be to sign a petition to a representative (e.g. elected or appointed official) to express support for a policy to expand free or discounted access to healthcare services for men who have sex with men in your area?

UICADVHC

(3) Very likely

(2) Somewhat likely
(1) Somewhat unlikely
(0) Very unlikely
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men", "Mobile phone apps (such as gay chat, dating and hookup apps)")

BHOC Questions

In the past 12 months, which dating/hookup smartphone apps have you used? Check all that apply.

[ ] Grindr	**BHOC_GRINDR**
[ ] Scruff	**BHOC_SCRUFF**
[ ] Tinder	**BHOC_TINDER**
[ ] Jack'd	**BHOC_JACKD**
[ ] Adam 4 Adam/RADAR	**BHOC_A4A**
[ ] GROWLr	**BHOC_GROWLR**
[ ] Mr. X	**BHOC_MRX**
[ ] Daddyhunt	**BHOC_DADDYHUNT**
[ ] Hornet	**BHOC_HORNET**
[ ] GuySpy	**BHOC_GUYSPY**
[ ] Squirt	**BHOC_SQUIRT**
[ ] Recon	**BHOC_RECON**
[ ] Other (please specify):: _____	**BHOC_OTHSPEC**
[ ] None of these	**BHOC_NONE**

Page entry logic: This page will show when: "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men", "Mobile phone apps (such as gay chat, dating and hookup apps)")

BHOC Questions, cont'd

Through which apps have you met a partner in person in the past 12 months? Check all that apply.

[ ] Grindr	**GRINDR_PERS**

[ ] Scruff	**SCRUFF_PERS**
[ ] Tinder	**TINDER_PERS**
[ ] Jack'd	**JACKD_PERS**
[ ] Adam 4 Adam/RADAR	**A4A_PERS**
[ ] GROWLr	**GROWLR_PERS**
[ ] Mr. X	**MRX_PERS**
[ ] Daddyhunt	**DADDYHUNT_PERS**
[ ] Hornet	**HORNET_PERS**
[ ] GuySpy	**GUYSPY_PERS**
[ ] Squirt	**SQUIRT_PERS**
[ ] Recon	**RECON_PERS**
[ ] Other (please specify): _____	**OTHAPP_PERS**
[ ] I have not met anyone in person from an app in the past 12 months	**NOAPP_PERS**

Page entry logic: This page will show when: (#93 Question "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men","Mobile phone apps (such as gay chat, dating and hookup apps)") AND Number of sites is greater than "1")

BHOC Questions, cont'd

Of the apps you have used in the past 12 months, which app would you say you used most often?

MOSTUSEDAPP

(1) Grindr
(2) Scruff
(3) Tinder
(4) Jack'd
(5) Adam 4 Adam/RADAR
(6) GROWLr
(7) Mr. X
(8) Daddyhunt
(9) Hornet
(10) GuySpy
(11) Squirt
(12) Recon
(13) Other

Page entry logic: This page will show when: "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men", "Mobile phone apps (such as gay chat, dating and hookup apps)")

BHOC Questions, cont'd

Logic: Hidden unless Number of sites is exactly equal to "1"

Have you met a partner in person through an app in the past 12 months?

BHOC_METAPP

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Have you seen advertisements on dating/hookup smartphone apps for home HIV tests?

HOMETESTADS

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Do you remember seeing any messages on dating/hookup smartphone apps on the importance of staying at home due to COVID-19?

COVIDAPPMSG

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

Page entry logic: This page will show when: ("Have you met a partner in person through an app in the past 12 months?" is one of the following answers ("Yes") OR Number of apps you met a partner in person is greater than "0")

BHOC Questions, cont'd

With your last new sex partner that you met on an app, how did you find out about his HIV status? Check all that apply.

[ ] His app profile	**BHOC_HIVSTAT_APP**
[ ] I talked to him about it	**BHOC_HIVSTAT_TALK**
[ ] I didn't know his HIV status	**BHOC_HIVSTAT_DK**
[ ] Other (please specify): _____	**BHOC_HIVSTAT_OTHSPEC**
[ ] I haven't met a sex partner on an app	**var1589O5813**

With your last new sex partner that you met on an app, how did you find out his preferred sexual health strategy (e.g. condoms, PrEP, treatment as prevention)? Check all that apply.

[ ] His app profile	**BHOC_STRAT_APP**
[ ] I talked to him about it	**BHOC_STRAT_TALK**
[ ] I didn't know	**BHOC_STRAT_DK**
[ ] Other (please specify): _____	**BHOC_STRAT_OTHSPEC**
[ ] I haven't met a sex partner on an app	**BHOC_STRAT_NOTMET**

Page entry logic: This page will show when: "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men", "Mobile phone apps (such as gay chat, dating and hookup apps)")

BHOC Questions, cont'd

Which of the following features are you aware of dating/hookup smartphone apps offering? Choose all that apply.

[ ] Sexual health testing reminders	**AWAREFEAT1**
[ ] Sexual health strategy profile options	**AWAREFEAT2**
[ ] HIV status profile options	**AWAREFEAT3**
[ ] Sexual health information and resources	**AWAREFEAT4**
[ ] None of these	**AWAREFEATNONE**

Page entry logic: This page will show when: "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men", "Mobile phone apps (such as gay chat, dating and hookup apps)")

BHOC Questions, cont'd

Which of the following dating/hookup smartphone app features have you used in the past 12 months? Choose all that apply.

[ ] Sexual health testing reminders	**REMIND_APPFEAT**
[ ] Sexual health strategy profile options	**STRATEGY_APPFEAT**
[ ] HIV status profile options	**HIVSTAT_APPFEAT**
[ ] Sexual health information and resources	**SEXINFO_APPFEAT**
[ ] None of these	**NONE_APPFEAT**

Page entry logic: This page will show when: "**In the past 12 months**, have you used any of the following kinds of internet sites to meet or socialize with gay men? Check all that apply." is one of the following answers ("Dating websites directed towards gay men", "Mobile phone apps (such as gay chat, dating and hookup apps)")

BHOC Questions, cont'd

Logic: (Number of features is exactly equal to "1" AND "Which of the following features are you aware of dating/hookup smartphone apps offering? Choose all that apply." is not one of the following answers ("None of these"))

In the past 12 months, have you used [question ("piped title")] in a dating/hookup smartphone app?

HIVSTAT_APPFEAT_SGL, REMIND_APPFEAT_SGL, SEXINFO_APPFEAT_SGL, STRATEGY_APPFEAT_SGL

(0) No
(1) Yes
(7) I prefer not to answer
(9) Don't know

In order to keep all users' sexual health information up-to-date (i.e., condom use, PrEP use, having an undetectable viral load, last test date), apps could prompt everyone to update it twice a year, like being asked to update your contact information.

How often would you prefer to complete this update?

FREQAPPUPDATE

(1) Every 3 months
(2) Every 6 months
(3) Once a year
(0) I do not want to be prompted to update my information

How much would you like your favorite dating/hookup app to provide the following features?

Maps of sexual health services in my area that show up next to other profiles, similar to the image below:

PREFAPPMAP

(2) I would like the app to add this
(1) I am neutral on whether the app adds this
(0) I would not like the app to add this

Videos about what happens to my data on the app:

PREFVIDAPP

(2) I would like the app to add this
(1) I am neutral on whether the app adds this
(0) I would not like the app to add this

COVID-19

Thanks for sticking with us! We have one more set of questions for you.

Now we're going to ask you a series of questions related to COVID-19.

Coronavirus disease 2019 (COVID-19) is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus that was first identified during an investigation into an outbreak in Wuhan, China. This next set of questions discuss how the COVID-19 pandemic has affected you.

Have you ever been tested for coronavirus (COVID-19)?

EVERCVTEST

(0) No
(1) Yes
(9) Don't know

Logic: "Have you ever been tested for coronavirus (COVID-19)?" is one of the following answers ("Yes")

When were you most recently tested for coronavirus (COVID-19)? If you don't know the exact date, please enter your best guess.

DT_COVIDTEST

_____

Page entry logic: This page will show when: "Have you ever been tested for coronavirus (COVID-19)?" is one of the following answers ("Yes")

COVID Testing Detail

When you last got tested, what type of sample did they take? Select all that apply.

[ ] Nose swab	**CVTEST_NOSE**
[ ] Throat swab	**CVTEST_THROAT**
[ ] Spit	**CVTEST_SPIT**
[ ] Blood	**CVTEST_BLOOD**

Logic: Hidden unless "When you last got tested, what type of sample did they take? Select all that apply." is one of the following answers ("Nose swab")

What was the result of your most recent nose swab test?

CVNOSE_RESULT

(1) Positive

(0) Negative

(9) I don't know

Logic: "When you last got tested, what type of sample did they take? Select all that apply." is one of the following answers ("Throat swab")

What was the result of your most recent throat swab test?

CVTHROAT_RESULT

(1) Positive

(0) Negative

(9) I don't know

Logic: "When you last got tested, what type of sample did they take? Select all that apply." is one of the following answers ("Spit")

What was the result of your most recent spit test?

CVSPIT_RESULT

(1) Positive

(0) Negative

(9) I don't know

Logic: "When you last got tested, what type of sample did they take? Select all that apply." is one of the following answers ("Blood")

What was the result of your most recent blood test?

CVBLOOD_RESULT

(1) Positive

(0) Negative

(9) I don't know

Logic: "When you last got tested, what type of sample did they take? Select all that apply." is one of the following answers ("Blood")

Do you know what type of blood test you had?

CVBLOOD_TYPE

(1) Antibody

(2) Antigen

(3) Both

(9) Not sure

COVID Diagnosis

Has a healthcare provider told you that you have coronavirus (COVID-19)?

EVERCVDX

(0) No

(1) Yes

(9) Don't know

Logic: "Has a healthcare provider told you that you have coronavirus (COVID-19)?" is one of the following answers ("Yes")

When did the provider tell you that you had coronavirus (COVID-19)? If you don't know the exact date, please enter your best guess.

DT_COVIDDX

_____

COVID-19

Compared to the time before COVID-19/Coronavirus, please tell us if COVID-19 and the plans used to manage COVID-19 have impacted these things related to quality of life, family, and your resources. Please tell us only if it has changed <u>because of</u> COVID-19.

	Has decreased/less because of COVID-19	**Has not changed or changed for reasons other than COVID-19**	**Has increased/more because of COVID-19**
General quality of life **CVCHNG_QOL**	(1)	(0)	(2)
Levels of anxiety **CVCHNG_ANX**	(1)	(0)	(2)
Quality of sleep **CVCHNG_SLEEP**	(1)	(0)	(2)
Feeling connected to family **CVCHNG_FAMCON**	(1)	(0)	(2)
Feeling connected to friends **CVCHNG_FRDCON**	(1)	(0)	(2)

Access to resources (food, money) **CVCHNG_RES**	(1)	(0)	(2)
Access to internet/stability of internet **CVCHNG_INTERNET**	(1)	(0)	(2)
Number of paid work hours **CVCHNG_WRKHR**	(1)	(0)	(2)
Need to financially support other family/partners who have lost jobs **CVCHNG_FINSUPP**	(1)	(0)	(2)
Difficulty buying food **CVCHNG_FOOD**	(1)	(0)	(2)
Difficulty paying rent **CVCHNG_RENT**	(1)	(0)	(2)

COVID-19

Compared to the time before COVID-19/Coronavirus, please tell us how COVID-19 and the plans used to manage COVID-19 have impacted you. Please tell us only if it has changed <u>because of</u> COVID-19.

	Yes, because of COVID-19	**No**	**Yes, but because of something other than COVID-19**
Have you lost your job, or one of your jobs? **CVCHNG_JOB**	(1)	(0)	(2)
Have you lost your health insurance?	(1)	(0)	(2)

CVCHNG_INS			
Have you become homeless or moved in with a friend due to being unable to pay housing costs? **CVCHNG_HMLESS**	(1)	(0)	(2)

COVID-19

Compared to the time before COVID-19/Coronavirus, please tell us if COVID-19 and the plans used to manage COVID-19 have impacted these things related to sexual health and substance use. Please tell us only if it has changed <u>because of</u> COVID-19.

	Has decreased/less because of COVID-19	**Has not changed or changed for reasons other than COVID-19**	**Has increased/more because of COVID-19**
Number of sexual partners **CVSEX_NUM**	(1)	(0)	(2)
Opportunities to have sex **CVSEX_OPP**	(1)	(0)	(2)
Your use of dating/hook-up apps to connect virtually with other men **CVSEX_APPVIR**	(1)	(0)	(2)
Access to condoms **CVSEX_CONDOMACCESS**	(1)	(0)	(2)
Use of condoms **CVSEX_CONDOMUSE**	(1)	(0)	(2)

Your use of dating/hook-up apps to meet other men in person **CVSEX_APPMEET**	(1)	(0)	(2)
Access to STI testing or treatment **CVSEX_STIACCESS**	(1)	(0)	(2)
Use of recreational drugs **CVSEX_DRUG**	(1)	(0)	(2)
Alcohol consumption **CVSEX_ALC**	(1)	(0)	(2)

Have you had trouble getting a STI test (like syphilis, gonorrhea or chlamydia) because of COVID-19 or the public health efforts to manage it?

CVSTITEST

(0) No

(1) Yes

(2) I haven't tried to get an STI test since COVID-19 began

Page entry logic: This page will show when: ("Have you **ever** been tested for HIV? An HIV test checks whether someone has the virus that causes AIDS." is one of the following answers ("No", "I prefer not to answer", "Don't know") OR ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Negative", "Never obtained results", "Indeterminate", "I prefer not to answer", "Don't know") AND "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is one of the following answers ("No","I prefer not to answer","Don't know")))

COVID-19 - Not HIV-Positive

Compared to the time before COVID-19/Coronavirus, please tell us if COVID-19 and the plans used to manage COVID-19 have impacted these things related to sexual health and substance use. Please tell us only if it has changed <u>because of</u> COVID-19.

	Has decreased/less because of COVID-19	Has not changed or changed for reasons other than COVID-19	Has increased/more because of COVID-19
Access to HIV testing **CVHLTH_HIVACCESS**	(1)	(0)	(2)
Getting HIV tested **CVHLTH_HIVTEST**	(1)	(0)	(2)
Access to PrEP **CVHLTH_PREPACCESS**	(1)	(0)	(2)
Taking PrEP every day as prescribed **CVHLTH_PREPADH**	(1)	(0)	(2)

Have you had trouble getting an HIV test because of COVID-19 or the public health efforts to manage it?

CVHIVTEST

(0) No

(1) Yes

(2) I haven't tried to get an HIV test since COVID-19 began

Page entry logic: This page will show when: "Are you currently taking PrEP?" is one of the following answers ("Yes")

COVID-19 - PrEP users

Have you had trouble getting your PrEP prescription from your doctor because of COVID-19 or the public health efforts to manage it?

CVPREP_PRES

(0) No

(1) Yes

(2) I haven't tried to get my prescription from my doctor since COVID-19 began

Have you had trouble getting your PrEP prescription filled at the pharmacy because of COVID-19 or the public health efforts to manage it?

CVPREP_FILL

(0) No

(1) Yes

(2) I haven't tried to get my prescription filled at the pharmacy since COVID-19 began

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Page entry logic: This page will show when: ("What was the result of your **most recent** HIV test in [MONTH/YEAR]?" is one of the following answers ("Positive") OR "Before your most recent test in [MONTH/YEAR], did you **ever** test positive for HIV?" is one of the following answers ("Yes"))

COVID-19 - HIV-Positive

Compared to the time before COVID-19/Coronavirus, please tell us if COVID-19 and the plans used to manage COVID-19 have impacted these things related to your HIV care. Please tell us only if it has changed because of COVID-19.

	Has decreased/less because of COVID-19	Has not changed or changed for reasons other than COVID-19	Has increased/more because of COVID-19
Access to HIV meds **CVHIV_MEDS**	(1)	(0)	(2)
Taking HIV meds every day as prescribed **CVHIV_ADH**	(1)	(0)	(2)
Getting HIV care clinical visits **CVHIV_CARE**	(1)	(0)	(2)
Getting viral loads or other labs done **CVHIV_LABS**	(1)	(0)	(2)

Have you had trouble getting your HIV medications prescriptions from your doctor because of COVID-19 or the public health efforts to manage it?

CVART_PRES

(0) No

(1) Yes

(2) I haven't tried to get my prescriptions from my doctor since COVID-19 began

Have you had trouble getting your HIV medication prescriptions filled at the pharmacy because of COVID-19 or the public health efforts to manage it?

CVART_FILL

(0) No

(1) Yes

(2) I haven't tried to get my prescriptions filled at the pharmacy since COVID-19 began

Have you had trouble making or keeping your HIV care appointments with your doctor because of COVID-19 or the public health efforts to manage it?

CVHIVCARETRBL

(0) No

(1) Yes

(2) I haven't tried to have an appointment with my doctor

COVID-19 Exposures

Have you come into close contact (within 6 feet) with someone who has a laboratory confirmed COVID-19 diagnosis in the past 14 days?

CVCONTACT

(0) No

(1) Yes

(7) I prefer not to answer

(9) Don't know

When you go out, how often do you wear a face mask?

MASKUSE

(4) Always (100%)

(3) Often (70 - 99%)

(2) Sometimes (31 - 69%)

(1) Rarely (1 - 30%)

(0) Never (0%)

How often are you trying to keep at least 6 feet between you and other people you don't live with to avoid spreading illness?

CVDISTANCE

(0) Never

(1) Rarely

(2) Sometimes

(3) Often

(4) Always

COVID-19 Exposures, cont’d

In the last month, how often have you gone out to grocery stores, pharmacies, or visiting other essential service providers?

CVESSENTIALS

(5) Daily

(4) Several times a week

(3) Once a week

(2) Once every two - three weeks

(1) Monthly or less often

(0) Never

In the last month, how often have you gone out to bars, dining at restaurants, exercising at gyms or other non-essential venues?

CVNOTESSENTIALFREQ

(5) Daily

(4) Several times a week

(3) Once a week

(2) Once every two - three weeks

(1) Monthly or less often

(0) Never

In the last month, how often have you used public transportation (bus/train) or car service (taxi/Uber/Lyft/other rideshare)?

CVTRANSPORT

(0) 0 times

(1) 1 - 2 times

(2) 3 - 5 times

(3) 6 - 10 times

(4) More than 10 times

COVID-19 Handwashing

Approximately how many times did you wash your hands with soap and water yesterday?

NUMHANDWASH

_____

Approximately how many times did you use hand sanitizer on your hands yesterday?

NUMSANITIZER

_____

COVID-19 self-collection

The next questions are about possible future testing for COVID-19 using a throat swab that you collect at home and mail to a laboratory for testing. Your results would be returned to you electronically and privately.

Please indicate whether you would be willing to do the following:

	Yes	**No**
I would be willing to use a home throat swab test as part of a research study. **CVSWABWILLRES**	(1)	(0)
I would be willing to use a home throat swab test if my doctor wanted to learn if I have the coronavirus. **CVSWABWILLMD**	(1)	(0)

COVID-19 self-collection

Please indicate whether you would be willing to do the following:

	Yes	**No**
I would be willing to collect spit at home as part of a research study. **CVSPITWILLRES**	(1)	(0)
I would be willing to collect spit at home if my doctor wanted to learn if I have the coronavirus. **CVSPITWILLMD**	(1)	(0)

COVID-19 self-collection

Please indicate whether you would be willing to do the following:

	Yes	No
I would be willing to collect blood spots at home as part of a research study. **CVDBSWILLRES**	(1)	(0)
I would be willing to collect blood spots at home if my doctor wanted to learn if I have the coronavirus. **CVDBSWILLMD**	(1)	(0)

Study Target Inquiries

We just have a few more questions left…

For this national study, we are recruiting a large number of men like you. Can you tell us the name of a social networking website or app where we could reach other men like you who might like to complete this survey?

REFSITES

_____

Future Contact

The PRISM Health team conducts many research projects at Emory University. Would you like to be contacted for potential participation in our future projects?

FUTURECONTACT

(1) Yes
(0) No

Logic: "The PRISM Health team conducts many research projects at Emory University. Would you like to be contacted for potential participation in our future projects?" is one of the following answers ("Yes")

Please provide the email address you would like for us to use to contact you for future studies.

EMAIL

_____

Referral Questions

Logic: HIV-positive study referral is exactly equal to "1"

Thank you for taking our survey! Based on your answers, you may be eligible to participate in a paid online health study.

Are you interested in learning more about the study and taking a short survey to see if you're eligible?

YT_REFERRED

(1) Yes

(0) No

Logic: HIV-positive study referral is exactly equal to "2"

Thank you for taking our survey! Based on your answers, you may be eligible to participate in a paid online health study.

Are you interested in learning more about the study and taking a short survey to see if you're eligible?

R21_REFERRED

(1) Yes

(0) No

Logic: (HIV-positive study referral is exactly equal to "3" OR HIV-negative study referral is exactly equal to "3")

Thank you for taking our survey! Based on your answers, you may be eligible to participate in a paid online health study.

Are you interested in learning more about the study and taking a short survey to see if you're eligible?

DREAMS_REFERRED

(1) Yes

(0) No

Logic: HIV-negative study referral is exactly equal to "1"

Thank you for taking our survey! Based on your answers, you may be eligible to participate in a paid online health study.

Are you interested in learning more about the study and taking a short survey to see if you're eligible?

P3_REFERRED

(1) Yes

(0) No

Logic: HIV-negative study referral is exactly equal to "2"

Thank you for taking our survey! Based on your answers, you may be eligible to participate in a paid online health study.

Are you interested in learning more about the study and taking a short survey to see if you're eligible?

COMPARE_REFERRED

(1) Yes

(0) No

Thank you for completing the survey! We are conducting another survey for guys like you to help us better understand messaging for HIV prevention and testing. This survey should take about 25 minutes to complete and you may want to consider completing it while accessing Wifi if cell phone data use is a concern. If you're interested, you can take the survey now or we can email you a link so you can take it later.

Do you want to take our survey about HIV prevention and testing messaging?

SOCMED_REFERRED

(1) Yes, I want to take the survey now

(2) Yes, please send a survey link to the email I provided earlier

(3) Yes, please send a survey link to the following email address: **[SOCMED_REF_EMAIL]**

(0) No, I don't want to take this survey

Survey End

Thank you for taking our survey! Your response is very important to us!

If you have any questions or comments, you may contact study staff at amis@emory.edu.

To get more information about HIV, please visit: www.cdc.gov/hiv

Otherwise, you can close your browser.
