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Katie Alexandra Thure Date

Applying the PrEP Continuum of Care for MSM at a national and individual state level in the United States

By

Katie Thure
MPH

Department of Epidemiology

_____

Dr. Aaron Siegler, PhD, MHS
Committee Chair

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By

Katie Alexandra Thure

Microbiology, Immunology, and Molecular Genetics, Bachelors of Science
University of California, Los Angeles
2013

Thesis Committee Chair: Dr. Aaron Siegler, PhD, MHS

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Abstract

Applying the PrEP Continuum of Care for MSM at a national and individual state level in the United States

By Katie Alexandra Thure

In a national online survey conducted in 2014 and 2015, we applied a pre-exposure prophylaxis (PrEP) care continuum on a national and state-by-state level for 2,604 men who have sex with men (MSM). Using logistic regression, we assessed the relationship between domains of the continuum, PrEP awareness, PrEP willingness and PrEP uptake, and characteristics of interest including demographics, risk factors and access to care. On a national level, 74% of MSM had heard of PrEP previously, 70% were willing to take PrEP, and 6% were currently taking PrEP. For individual states, the continuum varied, with PrEP awareness ranging from 56% to 86%, PrEP willingness 56% to 83%, and PrEP uptake 0% to 17%. Factors associated with PrEP awareness included higher age and education. Factors associated with PrEP willingness included risk behaviors such as anal sex with serodiscordant partner and higher number of partners. MSM with residential status in a state that expanded Medicaid under the Affordable Care Act were twice as likely to be on PrEP compared to MSM living in a state that had rejected Medicaid expansion. Although addressing barriers upstream of PrEP uptake, including PrEP awareness and PrEP willingness, may engage more MSM, this is likely not sufficient to bring PrEP to scale at levels suggested by the US Centers for Disease Control and Prevention. It is imperative to address institutional barriers to uptake, particularly regarding access to PrEP care.

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INTRODUCTION:

Due to the staggering 50,000 new human immunodeficiency virus (HIV) infections occurring annually and more than one million people currently affected in the United States, there is a need for new methods to address the HIV epidemic (1). Men who have sex with men (MSM) historically and currently bare the highest burden of HIV, accounting for more than 60% of recent infections in 2013 (1-4). Several studies have shown that as the epidemic persists, traditional approaches, (*e.g.* education, behavioral modification, and risk reduction) are less effective (5). Therefore it is urgent that additional prevention methods, such as chemoprophylaxis, are utilized

The Preexposure Prophylaxis Initiative (iPrEx) Trial and US MSM Safety Trial, both randomized, double-blind, placebo-controlled studies, using daily oral preexposure prophylaxis (PrEP) with a fixed-dose combination of tenofovir disoproxil fumarate (TDF) and emtricitabine (FTC) demonstrated the safety and efficacy of PrEP (6,7). Furthermore, in a Kaiser Family Foundation prospective cohort study with 657 participants, there were no new HIV infections in a 2.5 year follow up, indicating high effectiveness (8). The 2020 National HIV/AIDS Strategy for the United States notes a need to scale up PrEP through increased access to effective prevention services, including PrEP and post-exposure prophylaxis (PEP) (9). While PrEP is efficacious and covered under Medicaid, it is seemingly out of reach for many MSM due to medication and/or treatment costs, including copays or full payment for medication and laboratory tests, transportation to quarterly visits, and time missed from work. Despite its high

cost, modeling predicts PrEP scale up could substantially reduce HIV incidence, and cost analyses have also shown in the appropriate, high risk settings, PrEP could be a cost-effective HIV prevention tool (10-13). In order to scale PrEP up effectively and rapidly, it is imperative to better understand current engagement and attitudes towards PrEP among MSM. We have previously proposed a PrEP care continuum (14), based on the HIV prevention continuum (15) and the HIV care continuum (16). For predictive modeling purposes, we use an adapted version of the PrEP continuum to categorize HIV-negative MSM from a national study, which defines and categorizes at-risk MSM into various stages of PrEP care, specifically PrEP aware, PrEP willing, and PrEP uptake.

PrEP awareness in previous studies ranged from 16% of Californian MSM (17), 19% of MSM in Boston (18) and 26% of MSM in the 2014 Kaiser Family Foundation survey (19). PrEP awareness has been associated with risk behaviors, including condomless anal sex and sex under the influence of a drug for HIV acquisition (17, 18). MSM willing to take PrEP ranged from 58% to 70% (20-21). In previous studies, MSM interesting in taking PrEP was correlated with sexual risk behaviors. Demographics such as age, race/ethnicity, and income were not correlated with MSM being willing to take PrEP, and MSM with less than a college education were more likely to be willing to take PrEP (22). Potential barriers to MSM being willing to take PrEP included possible side effects (23), unawareness of one's PrEP eligibility (24), and stigma attached to PrEP users (25). Despite a 332% increase in new PrEP starts from early 2014 (26), PrEP uptake has been limited. CDC estimated that 492,000 MSM, or approximately one out of every four MSM, are PrEP eligible (27); however, through the IMS National Prescription

Database, which accounts for 39% of all PrEP prescriptions, Gilead reported in the first quarter of 2015, there were only a total of 8,512 unique PrEP individuals (26), or roughly 1.7% of eligible MSM.

To our knowledge, the present study is the first national and state-by-state assessment of the PrEP care continuum. The aim of the present analysis is to provide guidance at the national and state levels to identify gaps in PrEP.

METHODS:

Study Design and Eligibility Criteria

From October 2014 through March 2015, cycle two of the American Men's Internet Survey (AMIS) was conducted in the United States. AMIS is a cross-sectional behavioral survey of MSM in the United States. A more complete description of AMIS has been published (28). Briefly, participants were recruited through convenience sampling via advertisements on website banners, email blasts to website members, and using geosocial networking applications (i.e. Grindr, Tinder, Jack'D, Scruff, Recon, and Hornet) on smartphone and tablets. Participants were asked about sexual risk behaviors, illicit drug and alcohol use, use of HIV testing services, and access to prevention services, such as PrEP. Eligible participants were at least 16 years old, male at birth, had not received an HIV-positive test result, had at least one anal sex partner within the year prior to eligibility assessment, and could complete the survey in English. Participants could decline to answer any question; however, to be included in this analysis, participants had to answer all questions regarding the main outcome variables (PrEP aware, PrEP willing, and PrEP uptake).

We classified participants into several categories based on the PrEP Care continuum (14). Participants considered "PrEP aware" reported having heard of PrEP previously. Those classified as "PrEP willing" reported interested in taking daily oral PrEP. Participants classified as "PrEP discussion" reported a discussion with a provider regarding PrEP and "PrEP prescription" if a prescription was obtained. Participants categorized as "PrEP uptake" reported taking PrEP within the last twelve months. All participants were asked about PrEP awareness; however, if they were unaware they were only assessed regarding if they would be willing to take PrEP. All participants reporting awareness were further assessed on PrEP discussion, PrEP prescriptions, and PrEP uptake.

The study received ethical approval from the Emory University Institutional Review Board. Data were collected using encrypted HIPAA-compliant survey software and stored on an access-restricted secure data server at Emory University.

Measures

United States residency was determined through self-reported ZIP code of residence. A combination of county and zip code of residence was used to determine state. For those who did not report a ZIP code, the location of the participant's IP address collected by the survey software at survey completion was used to assign state of residence. We also determined states that have expanded Medicaid under the Affordable Care Act (37) based on data as of June 4th, 2015.

Eligible participants answered core questions consisting of demographics, sexual behavior, HIV testing history, drug and alcohol use, and HIV prevention services

exposure. The core questions were adapted and validated from the National HIV Behavioral Surveillance (NHBS) System. The timeframe for behaviors for these questions was also consistent with NHBS, with most HIV or sexual behaviors having a recall period of twelve months, and some other variables having shorter recall periods, such as alcohol use at last sex. PrEP recall was in the past twelve months. Participants were randomized into one of two sets of PrEP questions. The randomization into different question sets was part of a separate study aim, which was to explore the impact of a novel, more flexible wording of PrEP questions. To this end, two sets of wording were used: module one referenced PrEP as anti-HIV medicines prior to sex and module two used questions directly using the term PrEP. Due to similar or identical proportions for each wording type, and no detection of significant differences across numerous demographic and other predictor variables these two question wordings were combined into a single set of variables for the present study.

HIV risk factors included history of any sexually transmitted infections (STI) diagnoses (Gonorrhea, Chlamydia, Syphilis, Hepatitis, Genital herpes, Genital warts, Human papillomavirus (HPV)), lifetime history of injection drug use (heroin, cocaine, crack, crystal, etc.), past twelve month history of the following: non-injection drug use (marijuana, powdered cocaine, amyl nitrate, Ecstasy, painkillers, downers, crystal meth, hallucinogens, special K, GHB, crack cocaine, etc.), condom-less anal sex, known HIV-positive sexual partners, and number of male partners. We also assessed health insurance status, receipt of an HIV tests in the last twelve months, and if the participant had disclosed sexual orientation to a healthcare provider.

Statistical Analyses

The PrEP care continuum was applied at a national and state specific level as follows: Step 1: PrEP aware, Step 2: PrEP willing, Step: 3 PrEP discussion with a provider, Step 4: obtaining a prescription for PrEP from a provider and finally Step 5: PrEP uptake. While all states were represented in survey responses and entered into the logistic models, for state-by-state analyses of the PrEP continuum of care found in Appendix 1, states were only included if at least fifty at-risk MSM met eligibility criteria. Descriptive statistics were used to characterize and compare each continuum category by sociodemographic information, such as age, race/ethnicity, education level, and household income level in bivariate analyses, using χ^2 and Fisher exact assessments of significance, as appropriate. We also assessed associations between the outcomes of PrEP aware, PrEP willing, and PrEP uptake and self-reported HIV risk factors and measures of access and utilization of care. Consequently, after identifying all relevant HIV risk and measures of access and utilization of care through appropriate bivariate analyses, factors significant ($P < 0.05$) and feasible were included in a multivariate logistic model. Each multivariate logistic model was assessed for collinearity. All statistical analyses were performed using SAS version 9.4 (Cary, NC).

RESULTS:

Overall Participant Characteristics:

Demographics of individuals are described in Table 1, and risk characteristics and access to care variables are described in Table 2. In total, 2,604 MSM met inclusion criteria for the present study. There were 968 (37%) men 45 years or older, 537 (21%)

aged 35 to 44 years old, 737 (28%) aged 25 to 34 years old and 362 (14%) aged 15 to 24 years old. A majority (73%) of the MSM identified as non-Hispanic white, followed by Hispanic/Latino (16%) and African American (3%). The sample had 1,568 (60%) who completed college, post graduate or professional school. Approximately 39% of MSM reported a household income of at least $75,000, 26% were in between $40,000 and $74,999, and only 9% reported earning less than $19,999.

In terms of risk factors, 743 (29%) of the overall sample reported having an STI diagnosis in the past twelve months. The majority (96%) had no history of injection drug use. Nearly a third of the sample reported having ten or more partners in the past twelve months, with approximately one quarter having two to five partners. More than 80% of MSM reported having condomless anal sex in the last year; however, only 25% reported having anal sex with a partner of either serodiscordant or unknown status. Most participants had private health insurance (73%) and lived in a state that expanded Medicaid (62%). A majority of MSM had disclosed same-sex attraction to their healthcare provider (80%). In the last twelve months, 73% reported having an HIV test.

PrEP aware and correlates:

A number of demographics were significantly associated with greater awareness of PrEP, including age, education level, and household income. Using logistic regression to assess MSM who are PrEP aware (Table 3), greater age and higher education level were associated with increased PrEP awareness. MSM aged 15-24 years old were half as likely to be aware of PrEP compared to MSM aged 25-34 year old. (aOR 0.57, 95% CI: 0.39, 0.83). High school diploma, GED, or lower were also almost half as likely to be

aware of PrEP (aOR 0.55, 95% CI: 0.36, 0.85) when compared to those with some college, Associate's Degree, or Technical Degree. In contrast, those with a college degree or higher had 70% higher odds of PrEP awareness (aOR 1.70, 95% CI: 1.33, 2.19).

Factors indicating the presence of sexual risk, such as STI diagnoses in the past twelve months, use of non-injection drug use in the past twelve months, anal sex with serodiscordant or unknown partner last 12 months, and having increased number of male partners in the past twelve months were also significantly associated with PrEP awareness. MSM with an STI diagnoses in the past twelve months were 1.52 times more likely to be aware of PrEP compared to MSM without an STI diagnoses (aOR 1.52, 95% CI: 1.15, 2.03). MSM with ten or more partners were nearly four times higher odds of having heard of PrEP (aOR 3.72 95% CI: 2.60, 5.29) as MSM with only one partner.

Variables indicating greater access to or utilization of healthcare, including health insurance, recent HIV testing in the past twelve months, and disclosure of same-sex attraction to a healthcare provider, were also positively associated with PrEP awareness. MSM who reported an HIV test in the last twelve months were 71% more likely to be aware than those who did not have an HIV test (aOR 1.71 95% CI: 1.33, 2.20). MSM who disclosed sexual orientation to a healthcare provider were also more likely to be aware of PrEP (aOR 1.75, 95% CI: 1.30, 2.36).

Willingness to take PrEP and Correlates:

Demographic variables such as greater age, lower education, and race/ethnicity were associated with lower willingness to take PrEP. African-American MSM (74%) and Latino MSM (79%) were more likely to be willing to take PrEP than white MSM (68%)

(Table 1). In a multivariate logistic regression model, MSM aged 15-24 year olds were 30% more willing to take PrEP than MSM aged 25-34 year olds (aOR 1.30, 95% CI: 0.91, 1.87). MSM with a college degree or higher were 26% less likely to be willing to take PrEP compared to MSM with either some college, an Associate's degree, or technical degree (aOR 0.74, 95% CI: 0.59, 0.94).

Sexual risk, including anal sex with serodiscordant partner, sex with unknown HIV status partner, and overall number of male partners were positively associated with willingness to take PrEP. The odds of willingness to take PrEP were 2.48 times higher for MSM reporting anal sex with a serodiscordant or unknown partner status compared to MSM who did not report anal sex with a serodiscordant or unknown partner status (aOR 2.48, 95% CI: 1.87, 3.30). Men with more male partners were also more willing to take PrEP compared to those reporting only one male partner in the past twelve months. Men with ten or more male sex partners were nearly five times as likely to be willing to take PrEP compared to men with one partner (aOR 4.75, 95% CI: 3.53, 6.41).

Factors indicating greater access to care or utilization of healthcare, such as recent HIV test, also were associated with greater willingness to take PrEP. MSM who received an HIV test in the past twelve months were 79% more likely to be willing to take PrEP than those who had not received an HIV test (aOR 1.79, 95% CI 1.43, 2.24). Other care factors were not significantly associated with PrEP willingness.

PrEP Uptake and Correlates:

In a multivariate logistic regression model, demographic variables were not significantly associated with decreased PrEP usage. Factors indicating risky behavior,

such as recent STI diagnoses, anal sex with a serodiscordant or unknown partner status, and increased number of male partners were also significantly associated with increased PrEP uptake. More MSM that reported having an STI diagnoses in the past twelve months (12%) were on PrEP compared to MSM who reported not being diagnosed with an STI (4%). Only 7% of MSM engaged in condomless anal sex and 13% who reported anal sex with a partner of serodiscordant or unknown state were currently on PrEP. MSM who received an STI diagnosis in the past twelve months were 1.92 times as likely to be a PrEP user than those without an STI diagnoses (aOR 1.92 95% CI: 1.29, 2.86). MSM with a serodiscordant or unknown partner status had 3.05 times higher odds to be on PrEP than those who did not have anal sex with a serodiscordant or unknown status (aOR 3.05, 95% CI: 1.95, 4.78). MSM with more male partners were more likely to be on PrEP when compared to MSM that reported having only one sex partner.

Although not significant in models for PrEP aware and PrEP willing, residential status in a state that expanded Medicaid was a significant predictor of PrEP uptake. While most PrEP users (73%) resided in a state that expanded Medicaid. However, of these 73% of MSM. MSM that resided in a state with expanded Medicaid were 74% more likely to be currently on PrEP that those who lived in states that have yet to expand (aOR 1.74, 95% CI: 1.13, 2.70).

PrEP Care Continuum

At each stage of the PrEP continuum, the proportion of MSM decreased. Applying the PrEP Continuum at a national level, 74% of the sample had heard of PrEP previously, and of these 69% of MSM were willing to take daily oral PrEP. Despite the

large number of MSM aware and willing, only 9% had a conversation with their healthcare provider regarding PrEP, with less than 8% obtaining a prescription. Finally, 152 (6%) of at-risk MSM were currently taking daily oral PrEP. In additional to a national PrEP continuum, we also examined each individual state. All 17 states with at least fifty MSM had generally similar point estimates to national levels (Appendix 1).

DISCUSSION:

Utilizing the AMIS study, we found younger MSM, aged 15-24, were the least aware but most willing to take PrEP. MSM with only a high school diploma were also the least aware but also the most willing to begin taking PrEP if it were available. Overall, there were only 152 (5.9%) of 2,604 MSM currently on PrEP. These 152 MSM were, compared to the overall sample, older, more affluent, and more likely to be white. Those uptaking PrEP were more likely to engage in riskier behavior, such as higher partner numbers and sex with serodiscordant or unknown partner status. MSM currently on PrEP were also more likely to live in a state that expanded Medicaid under the Affordable Care Act.

Demographic factors, such as greater age and more education, were associated with increased awareness of PrEP. There were no significant differences between race/ethnicity and PrEP awareness. A majority of African-American MSM (75%) and white MSM (74%) were aware of PrEP. Comparable proportions of African-American MSM (74%) and white MSM (68%) were also willing to take daily oral PrEP. However, despite similar levels of awareness and willingness, it is currently projected that one out of every two black MSM and one out of every four Latino MSM will contract HIV in his

lifetime (30). Based on the results of this study, these men are not less aware or less willing to uptake PrEP, so a priority should be on making PrEP highly accessible for all MSM, particularly minorities.

Across the seventeen states that had over fifty eligible MSM in the AMIS study (Appendix A), the PrEP cascade appeared similar for each state in terms of those PrEP aware and PrEP willing, as most states had greater than 70% of PrEP aware MSM and 60% of MSM willing to take PrEP. Nevertheless, for PrEP uptake there is substantial range of differential values (0% to 15%) in the seventeen states. As mentioned earlier, it appears access to care is most relevant for PrEP uptake, rather than PrEP awareness or PrEP willingness. PrEP uptake was further examined in California (11%) and Georgia (3%) to better understand potential barriers.

California has not only expanded Medicaid, but also deployed various programs through health departments to increase the number of MSM currently taking PrEP. In 2014, California's Medi-Cal program eased access to PrEP by lifting requirements that forced providers to complete an authorization request, which required Medi-Cal patients seeking PrEP to meet conditions such as monthly HIV testing and provision of condoms, when prescribing PrEP (31). Through removing these requirements, Medi-Cal alleviated some provider burden and attempted to close the large gap in the access to PrEP. By contrast, Georgia has the largest income gaps in the United States (32), and due to not expanding Medicaid under the Affordable Care Act, nearly 305,000 Georgians are currently living without health insurance, of whom 74% are people of color (33). Along with being uninsured, poorer MSM living in Georgia must also overcome other financial

barriers to obtaining PrEP, such as transportation to see a provider quarterly, cost of medication, routine lab visits, etc.).

Although some states are more effective at scaling up PrEP, the United States as a whole is not as successful as it needs to be to curb the HIV epidemic. This is reflected in the homogeneity displayed in the PrEP Care Continuum of the seventeen states. CDC estimated one out of every four (25%) sexually active HIV-negative adult MSM are eligible candidates to reduce new HIV infections through the utilization of PrEP (27). However, even states like California and Massachusetts, which have both attempted early health reforms as well as access to tailored behavioral health programs, have substantial scale-up to achieve the goal of25% of MSM taking PrEP.

In order to reach the estimated 25% of PrEP-eligible MSM, it is essential to examine barriers upstream of uptake. In this study, it was found that older and more affluent MSM are significantly more likely to be aware of PrEP than other demographics, which may suggest PrEP messaging may not be reaching younger, less affluent MSM, even though, this population is the most willing to use PrEP. It is hypothesized that older, more educated, wealthy MSM are more aware due to greater access to HIV focused care and understanding of HIV risks. Some barriers for younger MSM to engage in prevention activities might include general attitudes around HIV risks and HIV acquisitions (34-35). Consequently, younger MSM may not be aware of PrEP. Novel approaches that appeal to and reach younger demographics, such as social media campaigns, may help to increase PrEP awareness among this vulnerable group.

Provider knowledge is another barrier to be considered for PrEP uptake. Castel et al. described provider's perception of PrEP by dichotomously comparing physicians who perceived PrEP to be moderately effective to those who perceived PrEP as less effective (36). Providers who viewed PrEP to be less effective were more likely to believe their practice was not equipped to support the requirements of prescribing PrEP (*e.g*. quarterly visits, etc.), had less knowledge and experience regarding PrEP, and had concerns that PrEP could lead to increased condomless anal sex. Provider hesitation to prescribe PrEP could include a lack of information regarding the drug toxicity, cost, and finally medication adherence. However, increasing provider knowledge is associated with higher rates of currents PrEP prescriptions and future intent to continue prescribing PrEP (37). Therefore, it is imperative providers are offered further learning opportunities regarding PrEP outside of the CDC guidance document.

Limitations:

There are several limitations to the present study. A convenience sample approach was utilized, which likely impacts the potential generalizability of the study, although a previous study has shown that online samples of MSM can be similar to venue-based samples (38). Because the study did not incentivize participants, there is potentially greater volunteer bias, which could increase the estimates for PrEP awareness, as these participants might be more knowledgeable on MSM health related issues and practices. There was also an under-representation of African-American MSM respondents, which is common amongst internet based studies. Socially desirable

answers might be inflated (*e.g.* last HIV test, anal sex with condoms, etc.); consequently access to care might be overestimated in these results.

Final Conclusions:

Although PrEP awareness varies from the study-to-study, ranging from 26% of MSM in the 2014 Kaiser Family Foundation survey (19) to 74% in this current study, there is more work to be done to increase awareness. Scaling up PrEP in a way that all those eligible have access is essential to addressing the current HIV epidemic. Developing a national strategy could help improve access to PrEP. Through this national effort, along with increased funding for free or low-cost PrEP, resources could be made available to target facilities where eligible, at-risk MSM are engaging in healthcare, such as primary care facilities. This national strategy needs to be developed and implemented in a way that facilitates access to PrEP for all eligible persons, in order to allow for maximum impact in preventing HIV in the United States. It is essential PrEP is scaled up in a way that will not allow the disparities in HIV to worsen. However, if PrEP remains accessible to only those who can afford the medication, the gaps will inevitability widen.

Table 1: Bivariate analysis of socio-demographic characteristics by total sample, PrEP aware, PrEP willing, and PrEP uptake

	All MSM[a] (N=2,604)		PrEP Aware (N=1,925)		PrEP Willing (N=1,810)		PrEP Uptake (N=152)	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Age								
15-24	362	14%	230	64%	283	78%	12	3%
25-34	737	28%	575	78%	526	71%	55	7%
35-44	537	21%	414	77%	381	71%	33	6%
≥45	968	37%	706	73%	620	64%	52	5%
Race/ethnicity								
American Indian or Alaska Native	18	1%	12	67%	13	72%	1	6%
Asian/Native Hawaiian/Other Pacific	59	2%	43	73%	34	58%	1	2%
Black or African American	87	3%	65	75%	64	74%	5	6%
Hispanic/Latino	420	16%	305	73%	331	79%	25	6%
White	1,891	73%	1,399	74%	1,280	68%	111	6%
Education Level								
High school diploma, GED or lower	201	8%	93	46%	155	77%	6	3%
Some college, Associate's Degree, or Technical Degree	818	31%	546	67%	603	74%	31	4%
College, post graduate or professional school	1,568	60%	1,274	81%	1,040	66%	114	7%
Household Income								
$0 to $19,999	227	9%	153	67%	176	78%	7	3%
$20,000 to $39,999	469	18%	311	66%	355	76%	31	7%
$40,000 to $74,999	685	26%	495	72%	472	69%	31	5%
$75,000 or more	1,021	39%	821	80%	651	64%	67	7%

[a] Men who have sex with men

[b] Some categories might not sum up to the column total, as they were recorded as missing or preferred not to respond.

[c] All X^2 values were less than 0.001 for parts in gray

Table 2: Bivariate analysis of factors related to HIV risk behavior and access and utilization of healthcare by PrEP aware, PrEP willing, and PrEP uptake

	All MSM[a] (N=2,604)		PrEP Aware (N=1,925)		PrEP Willing (N=1,810)		PrEP Uptake (N=152)	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Risk Factor								
STI Diagnoses in the past 12 months								
No	1,861	71%	1,303	70%	1,244	67%	66	4%
Yes	743	29%	622	84%	566	76%	86	12%
History of injection drug use								
No	2,497	96%	1,852	74%	1,740	70%	145	6%
Yes	98	4%	68	69%	64	65%	7	7%
History of non-injection drug use								
No	1,753	67%	1,265	72%	1,171	67%	77	4%
Yes	830	32%	645	78%	625	75%	74	9%
Condomless Anal Sex								
No	530	20%	382	72%	344	65%	11	2%
Yes	2,074	80%	1,543	74%	1,466	71%	141	7%
Serodiscordant or Unknown partners								
No	1,958	75%	1,403	72%	1,251	64%	65	3%
Yes	646	25%	522	81%	559	87%	87	13%
Number of partners in past 12 months								
1	556	21%	337	61%	232	42%	2	0%
2 to 5	716	27%	481	67%	504	70%	14	2%
6 to 9	298	11%	234	79%	231	78%	11	4%
≥ 10	791	30%	682	86%	669	85%	102	13%

Table 2 (continued)

	All MSM[a] (N=2,604)		PrEP Aware (N=1,925)		PrEP Willing (N=1,810)		PrEP Uptake (N=152)	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Access and utilization of healthcare								
Health Insurance coverage								
None	198	8%	152	77%	145	73%	16	8%
Private Only	1907	73%	1464	77%	1306	68%	116	6%
Other/Multiple	185	7%	122	66%	131	71%	9	5%
Did not respond	135	5%	79	59%	103	76%	3	2%
Reside in a state that expanded Medicaid								
No	981	38%	712	73%	680	69%	40	4%
Yes	1623	62%	1213	75%	1130	70%	112	7%
HIV Test in the past 12 months								
No	698	27%	429	61%	361	52%	2	0%
Yes	1,906	73%	1,496	78%	1,449	76%	150	8%
Out to provider								
No	365	14%	232	64%	251	69%	2	1%
Yes	2,077	80%	1,614	78%	1,436	69%	126	6%

[a] Men who have sex with men

[b] Some categories might not sum up to the column total, as they were recorded as missing or preferred not to respond.

[c] All X^2 values were less than 0.05 for parts in gray

Table 3: Multivariate Analyses of PrEP aware, PrEP willing, and PrEP uptake by sociodemographics characteristics, HIV risk behaviors, and access and utilization of care

	PrEP Aware (N=1,925)		PrEP willing (N=1,810)		PrEP Uptake (N=152)	
	aOR[a]	95% CI[b]	aOR	95% CI	aOR	95% CI
Demographics						
Age						
15-24	0.57	(0.39, 0.83)	1.30	(0.91, 1.87)	0.65	(0.33, 1.31)
25-34	**ref**		**ref**		**ref**	
35-44	0.77	(0.55, 1.09)	1.07	(0.50, 1.44)	0.84	(0.50, 1.43)
≥45	0.69	(0.51, 0.93)	0.78	(0.60, 1.01)	0.77	(0.48, 1.22)
Race/ethnicity						
American Indian or Alaska Native			1.23	(0.35, 4.40)		
Asian/Native Hawaiian/Other Pacific			0.40	(0.21, 0.76)		
Black or African American			1.08	(0.60, 1.96)		
Hispanic/Latino			1.39	(1.03, 1.88)		
White	**ref**		**ref**		**ref**	
Other			1.33	(0.78, 2.28)		
Educational Level						
High school diploma, GED or lower	0.55	(0.36, 0.85)	1.22	(0.79, 1.88)	0.93	(0.34, 2.52)
Some college, Associate's Degree, or Technical Degree	**ref**		**ref**		**ref**	
College, post graduate or professional school	1.70	(1.33, 2.19)	0.74	(0.59, 0.94)	1.70	(1.07, 2.71)
Household Income						
$0 to $19,999	1.50	(0.94, 2.40)	0.95	(0.62, 1.47)		
$20,000 to $39,999 **R**	**ref**		**ref**		**ref**	
$40,000 to $74,999	1.33	(0.96, 1.84)	0.81	(0.60, 1.11)		
$75,000 or more	2.16	(1.55, 3.01)	0.85	(0.63, 1.15)		
Risk Factor						
STI Diagnoses in the past 12 months						
No	**ref**		**ref**		**ref**	
Yes	1.52	(1.15, 2.03)	1.17	(0.92, 1.49)	1.92	(1.29, 2.86)
History of injection drug use						
No						
Yes						
History of non-injection drug use						
No	**ref**		**ref**		**ref**	
Yes	1.27	(0.98, 1.65)	0.92	(0.73, 1.16)	1.33	(0.90, 1.98)
Condomless Anal Sex						
No	**ref**		**ref**		**ref**	
Yes			1.01	(0.78, 1.29)	1.42	(0.68, 2.97)
Serodiscordant or Unknown partners						
No	**ref**		**ref**		**ref**	
Yes	1.27	(0.95, 1.70)	2.48	(1.87, 3.30)	3.05	(1.95, 4.78)
Number of partners in last 12 months						
1	**ref**		**ref**		**ref**	
2 to 5	1.46	(1.10, 1.94)	2.71	(2.09, 3.51)	4.75	(1.07, 21.16)
6 to 9	2.56	(1.70, 3.87)	3.08	(2.17, 4.39)	7.18	(1.55, 33.14)
≥ 10	3.72	(2.60, 5.29)	4.75	(3.53, 6.41)	18.93	(4.55, 78.81)
Access to Care or Utilization of Healthcare						
Health Insurance coverage						
None	2.40	(1.06, 5.44)				
Private Only	1.64	(1.06, 2.54)				
Public Only	**ref**		**ref**		**ref**	
Other/Multiple	1.22	(0.70, 2.12)				
Reside in a state that expanded Medicaid						
No	**ref**		**ref**		**ref**	
Yes					1.73	(1.13, 2.65)
HIV Test in the past 12 months						
No	**ref**		**ref**		**ref**	
Yes	1.71	(1.33, 2.20)	1.79	(1.43, 2.24)		
Out to provider						
No	**ref**		**ref**		**ref**	
Yes	1.75	(1.30, 2.36)				

[a]aOR Adjusted Odds Ratio

[b]95% CI - 95% Confidence Interval

Appendix A:

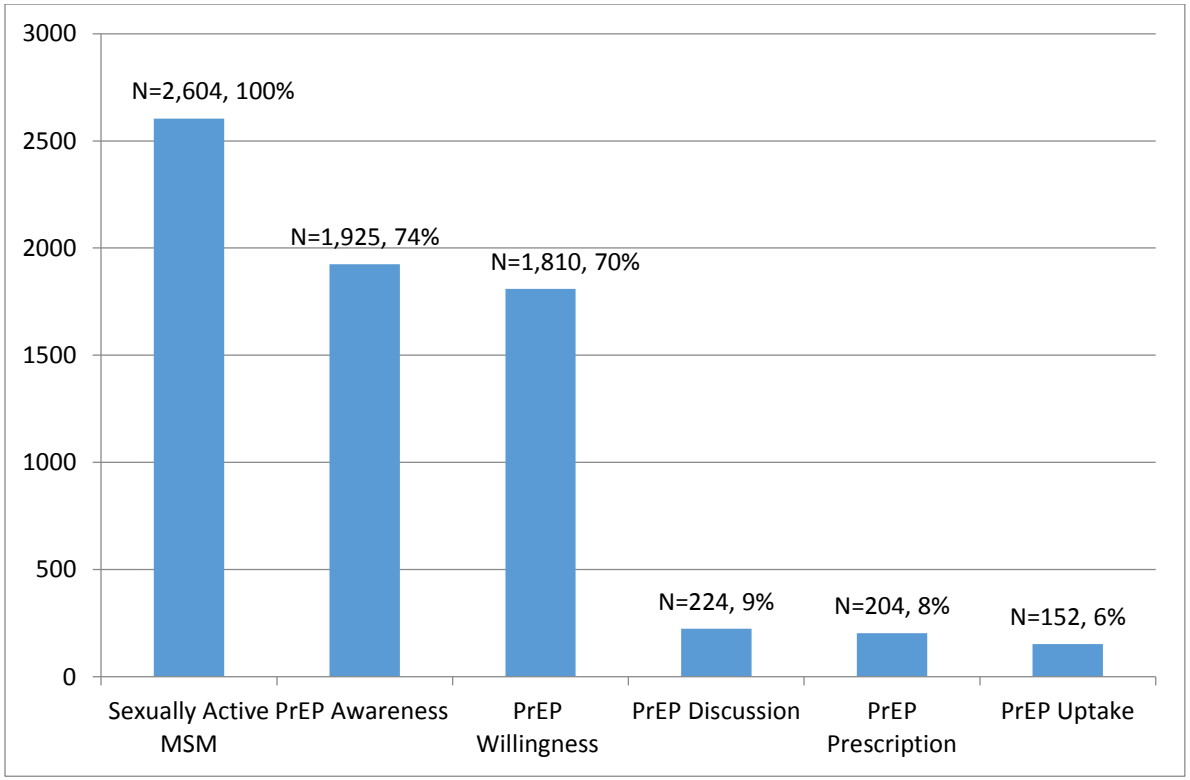

Figure 1: The PrEP care continuum for the United States

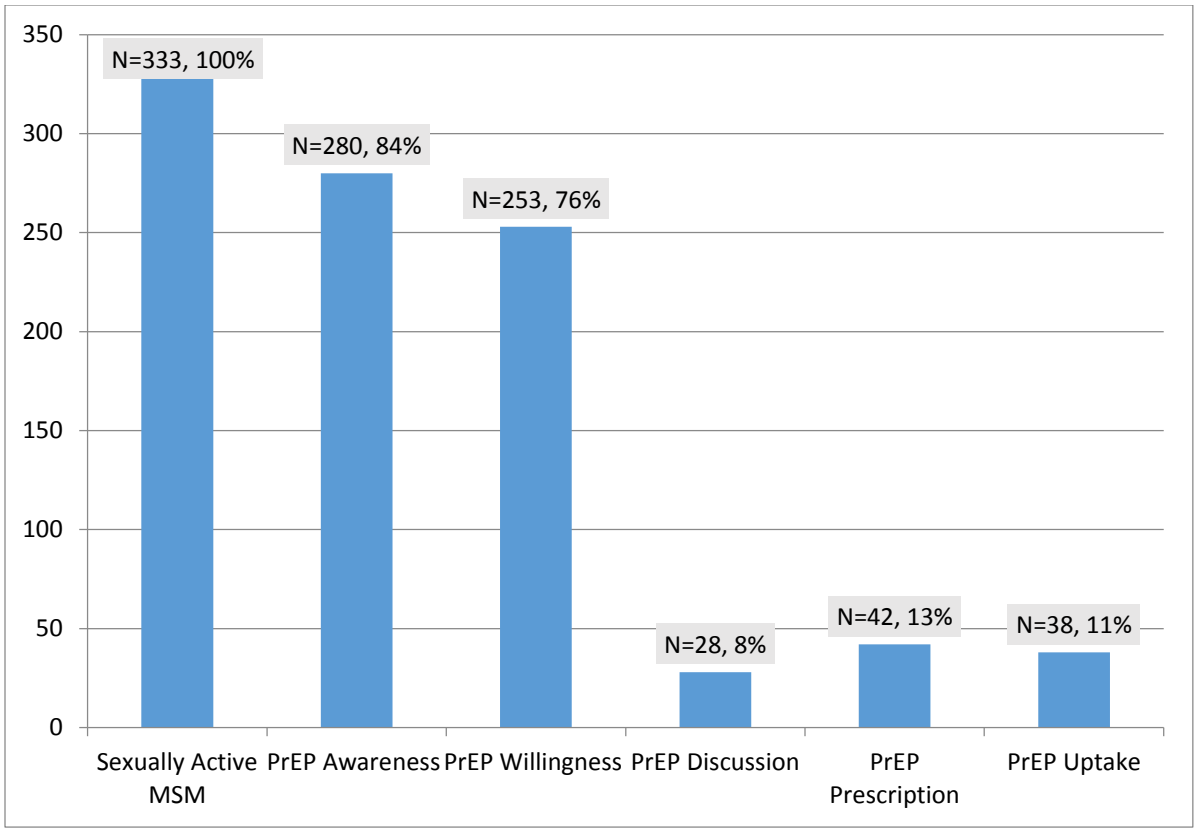

Figure 2: The PrEP care continuum for California

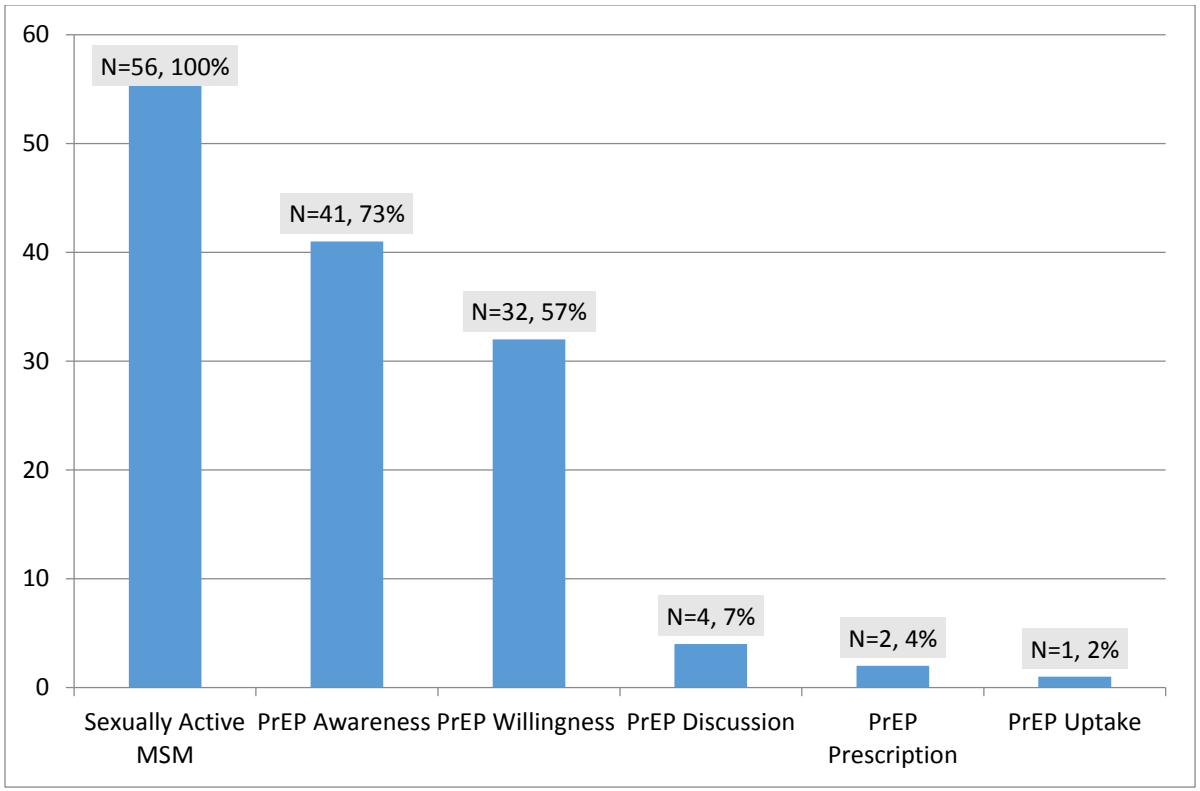

Figure 3: The PrEP care continuum for Colorado

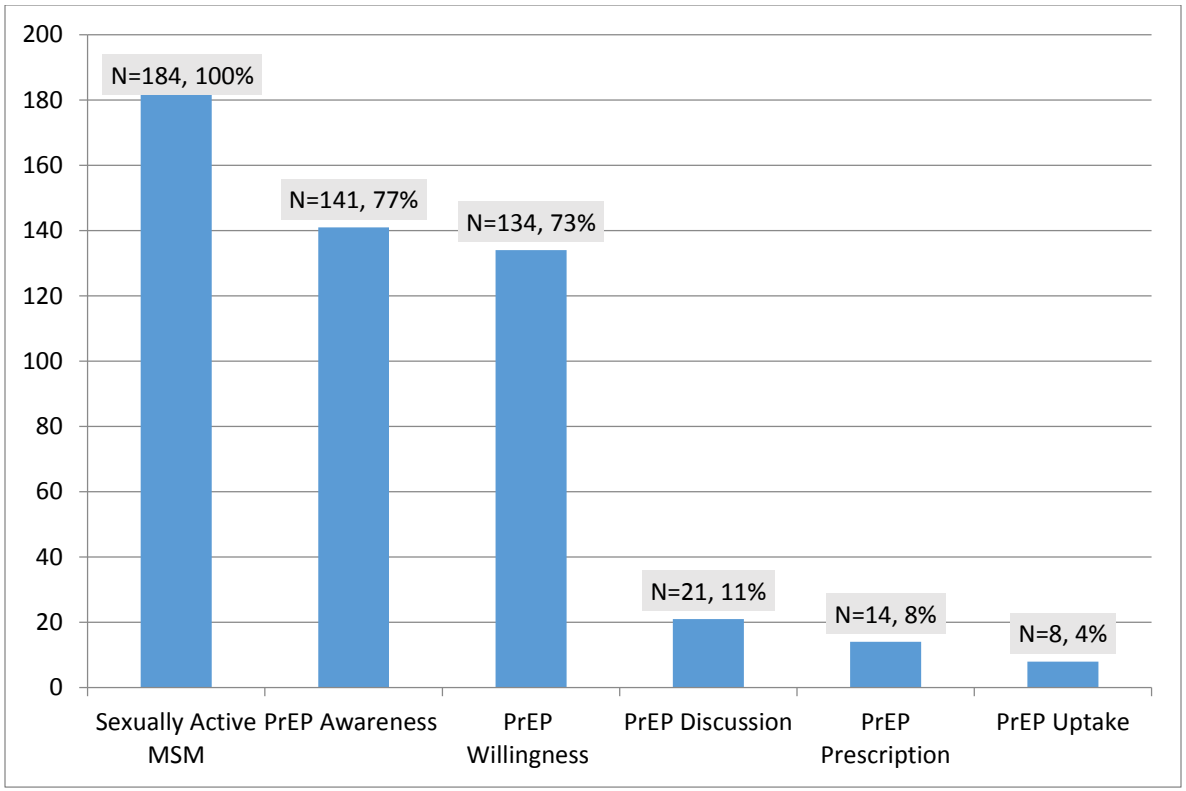

Figure 4: The PrEP care continuum for Florida

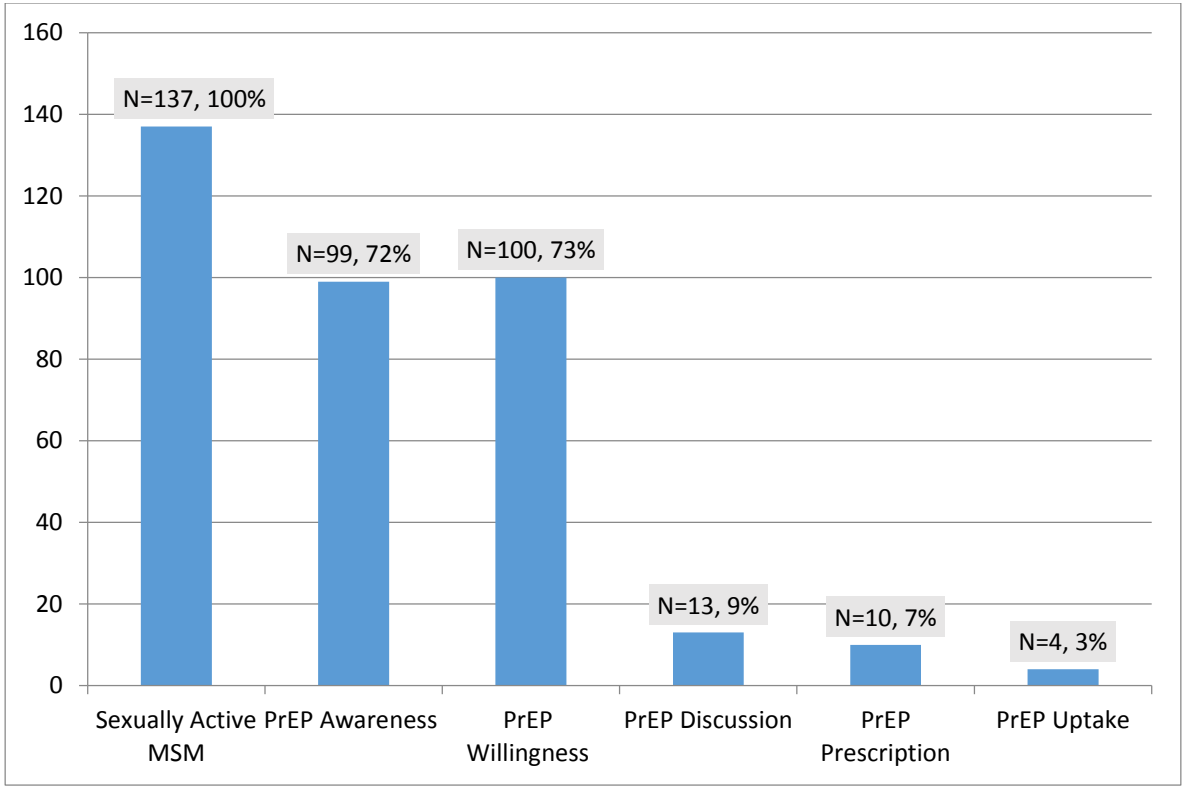

Figure 5: The PrEP care continuum for Georgia

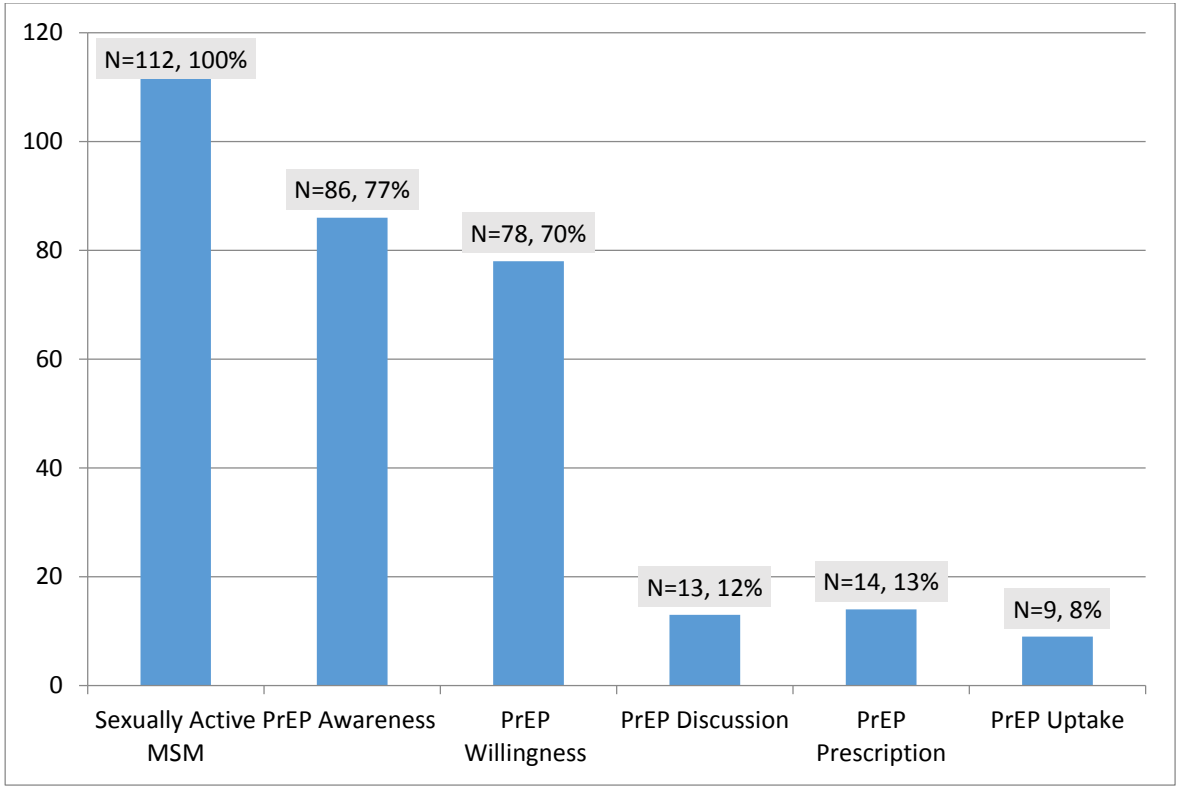

Figure 6: The PrEP care continuum for Indiana

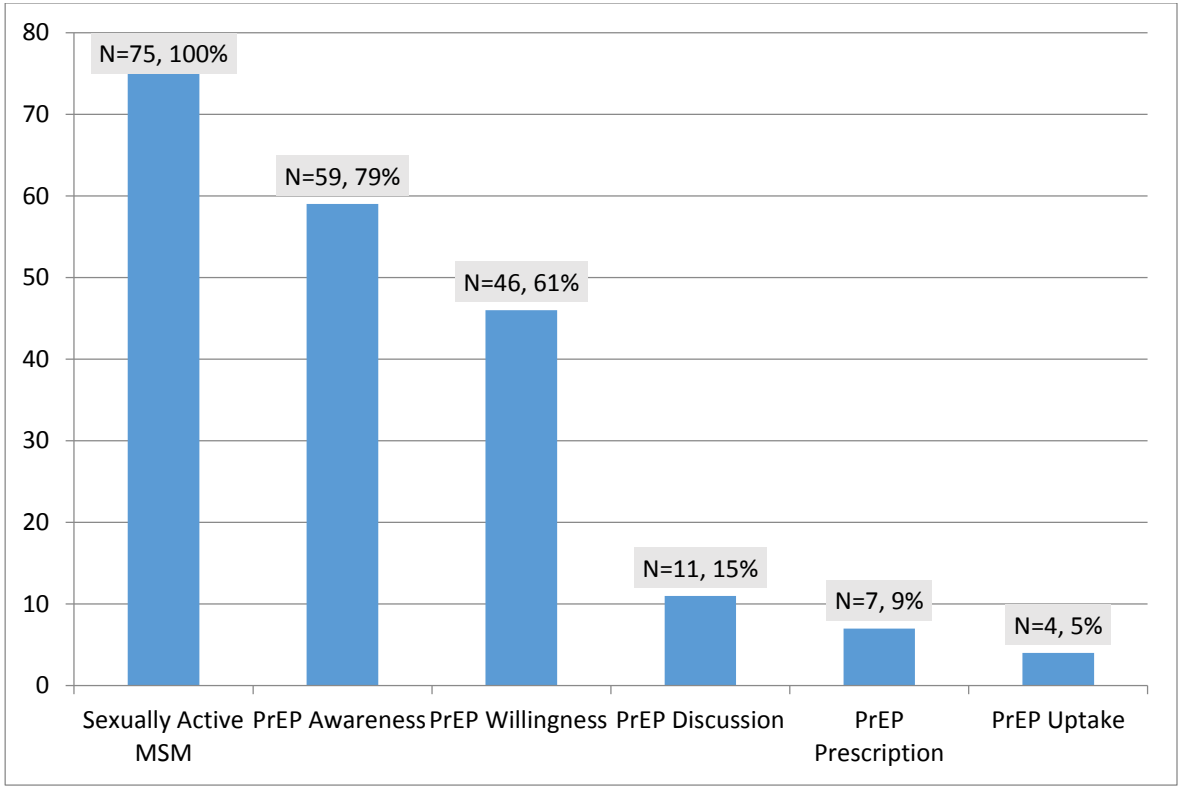

Figure 7: The PrEP care continuum for Massachusetts

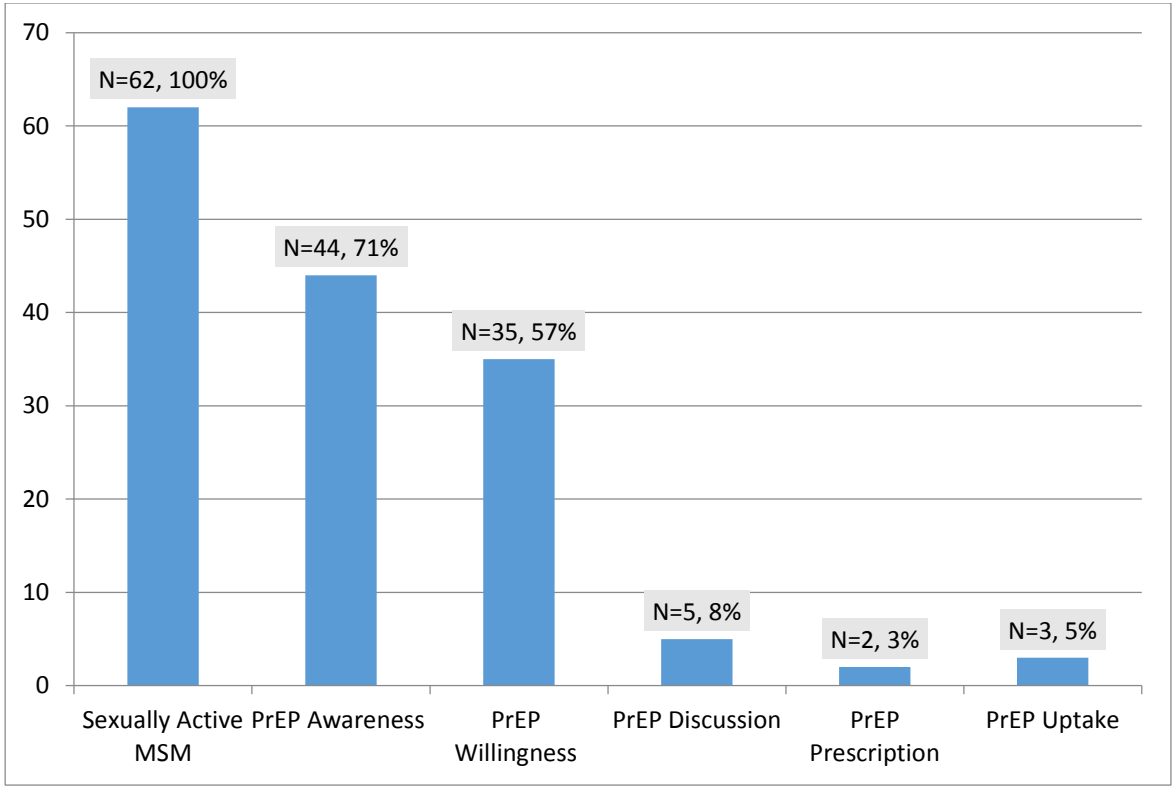

Figure 8: The PrEP care continuum for Michigan

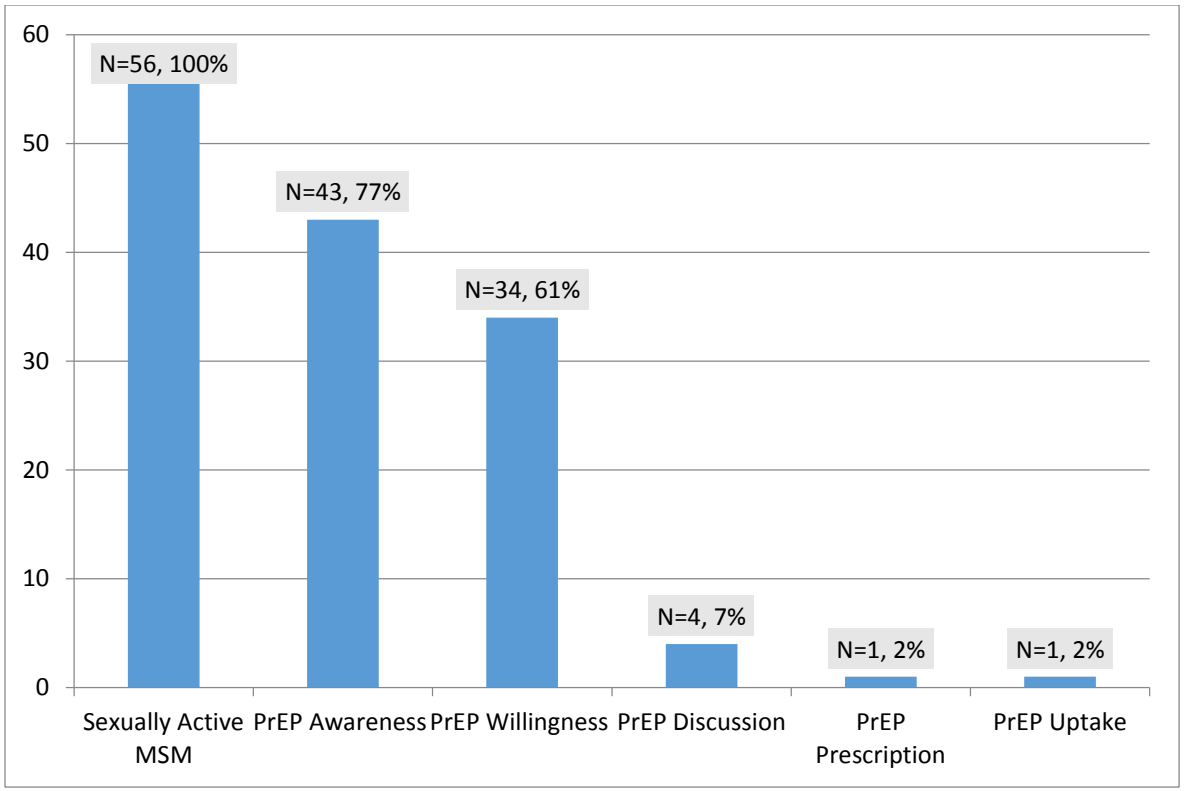

Figure 9: The PrEP care continuum for Mississippi

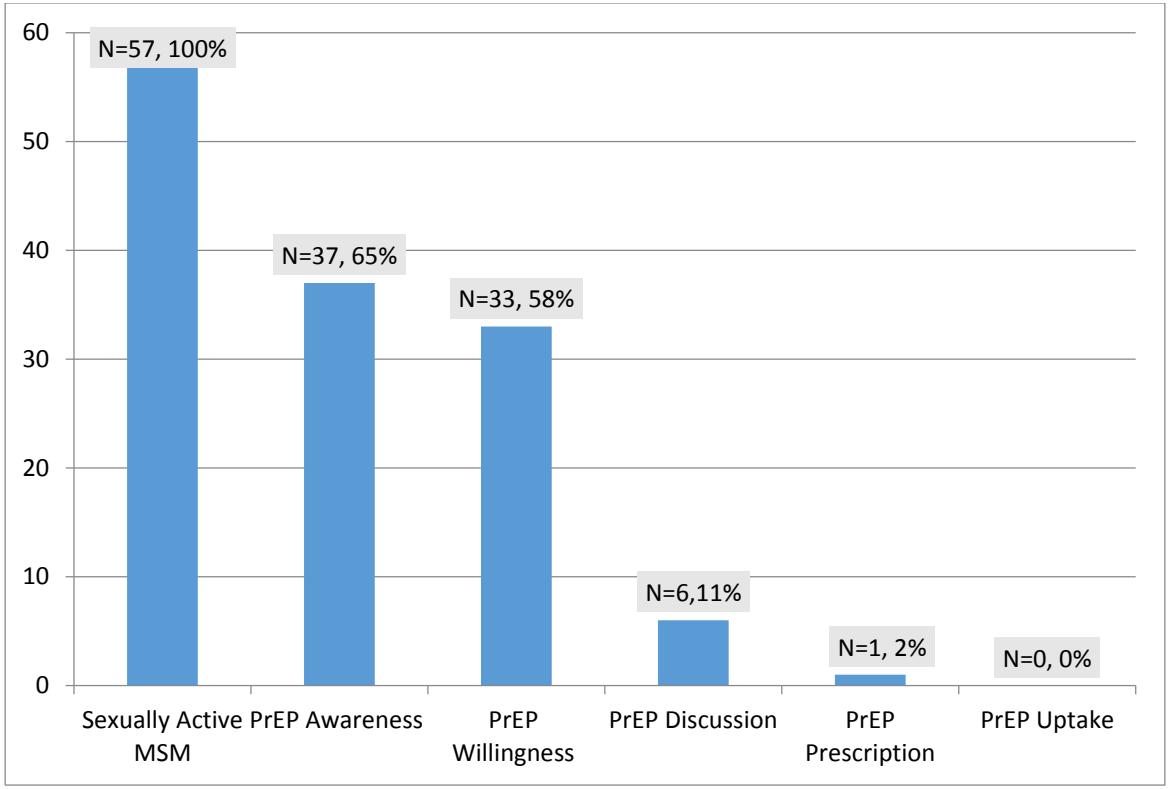

Figure 10: The PrEP care continuum for New Jersey

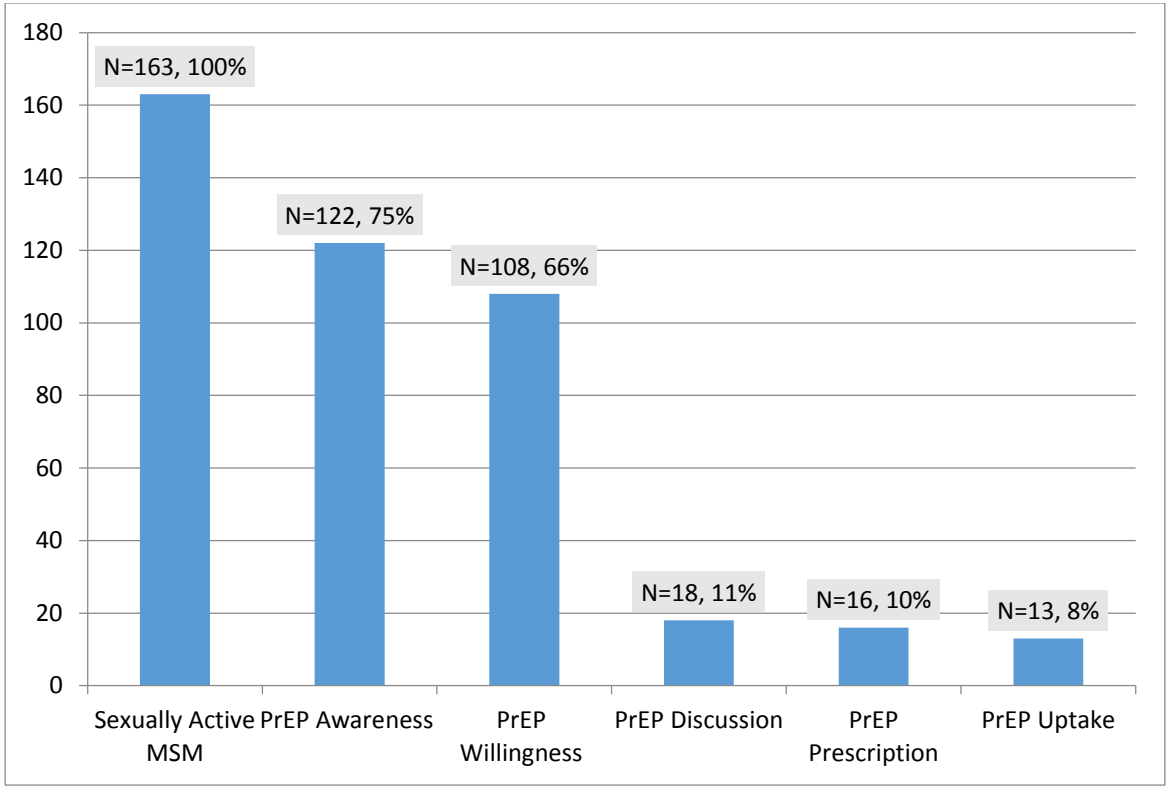

Figure 11: The PrEP care continuum for New York

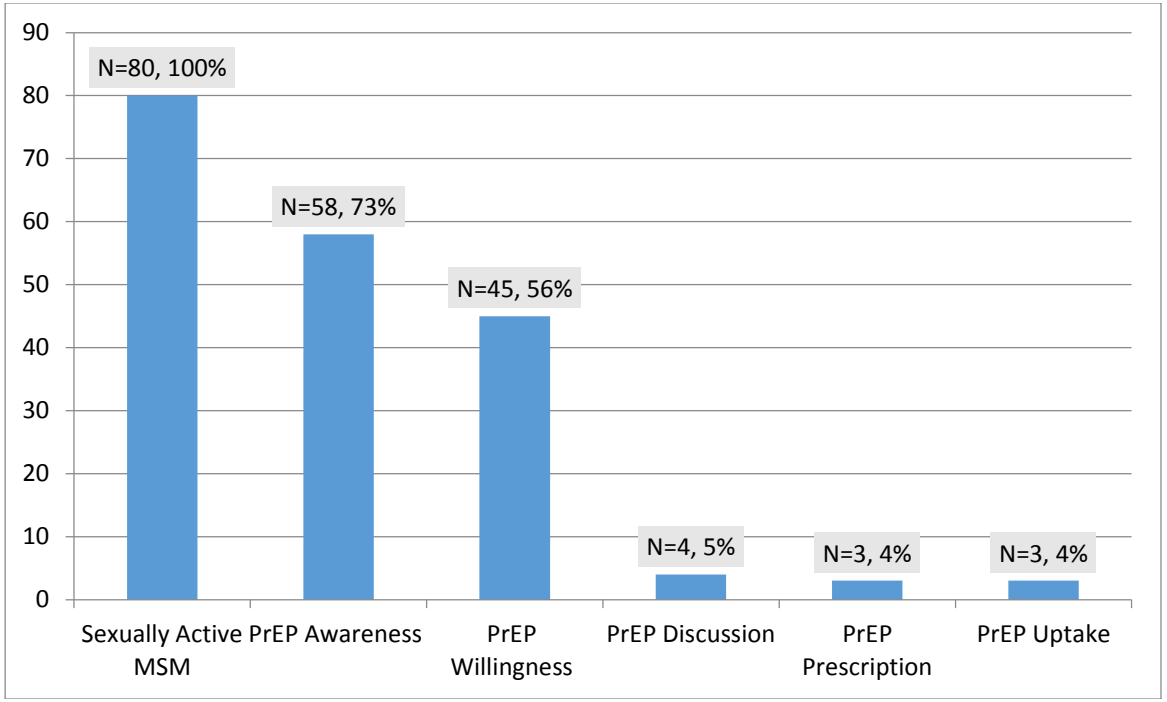

Figure 12: The PrEP care continuum for North Carolina

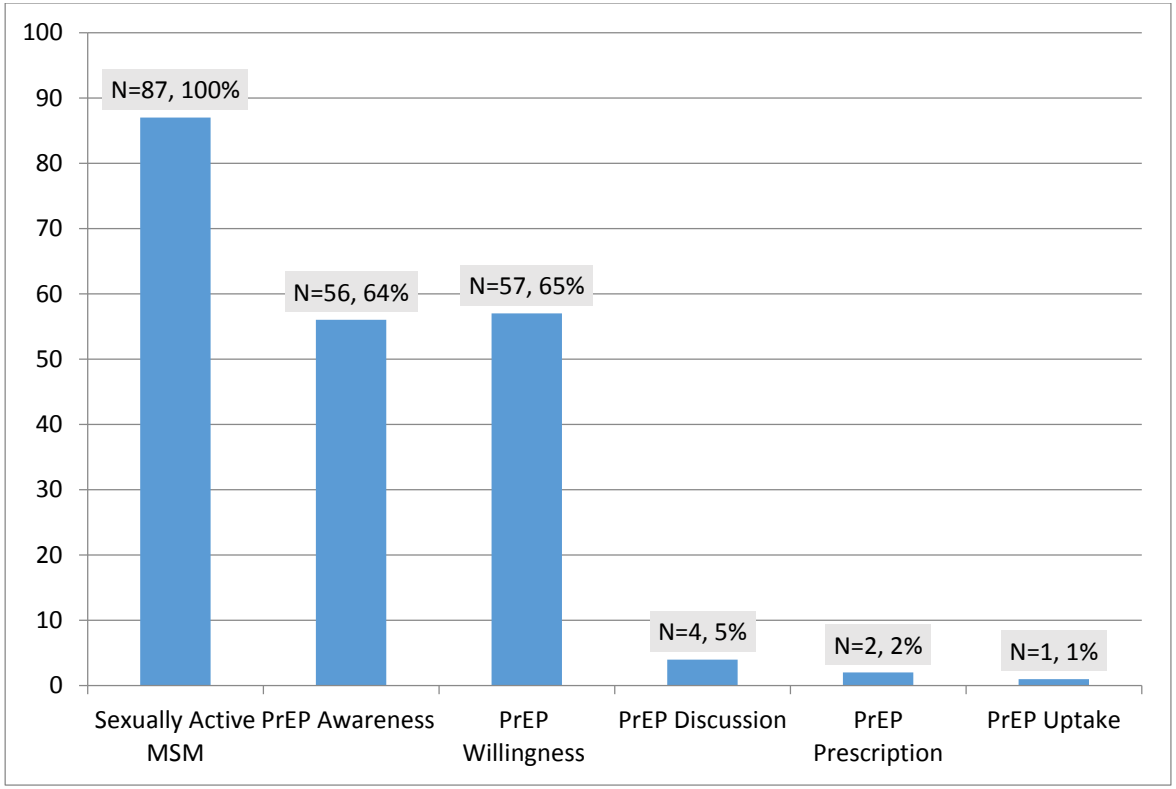

Figure 13: The PrEP care continuum for Ohio

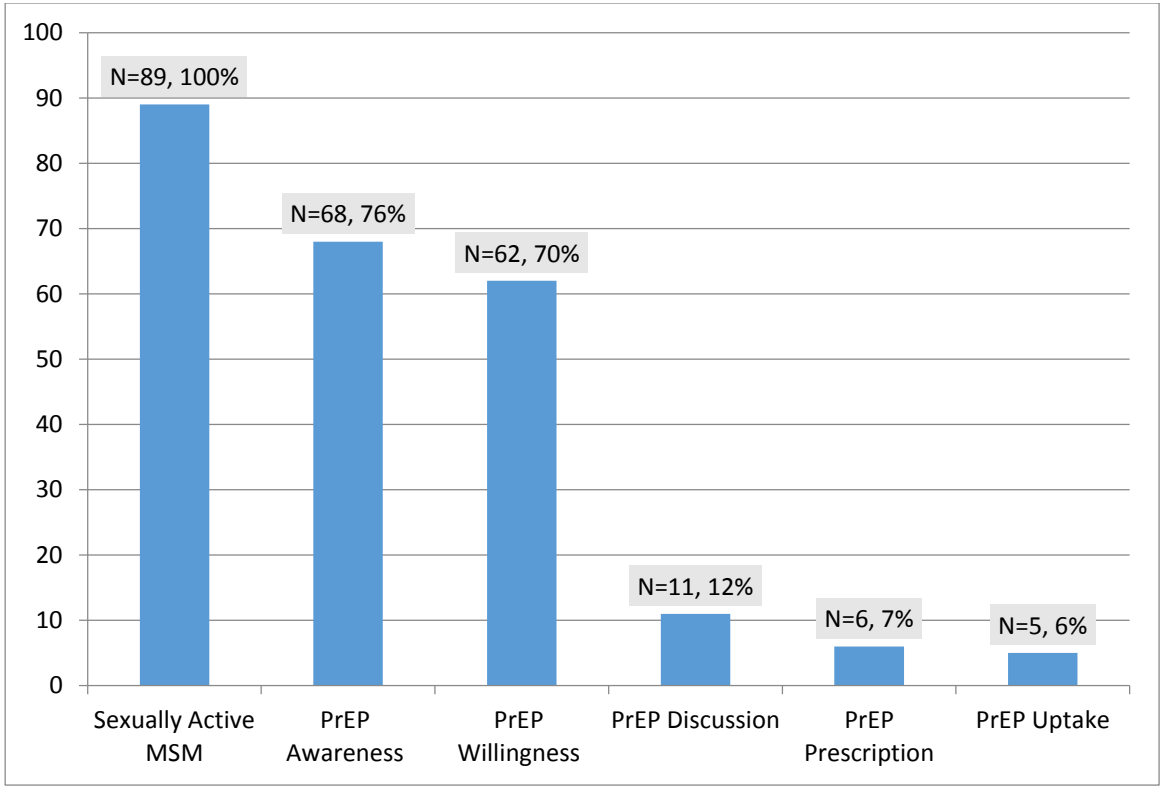

Figure 14: The PrEP care continuum for Pennsylvania

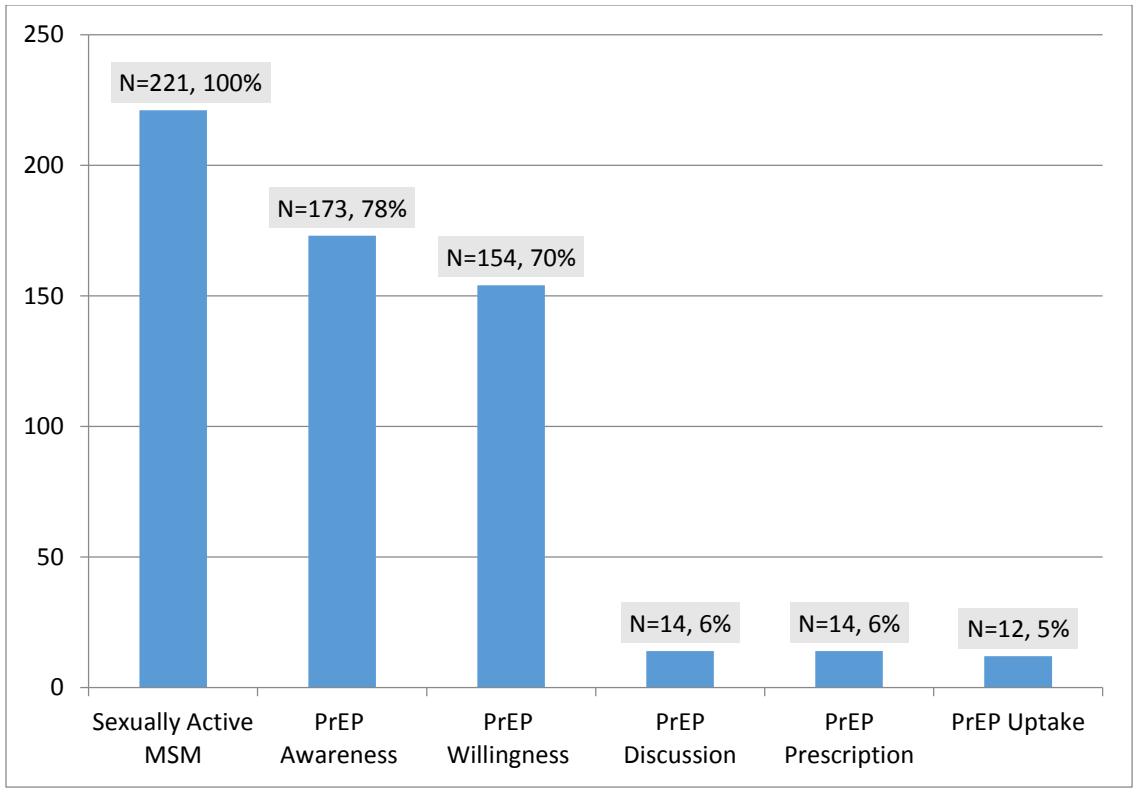

Figure 15: The PrEP care continuum for Pennsylvania

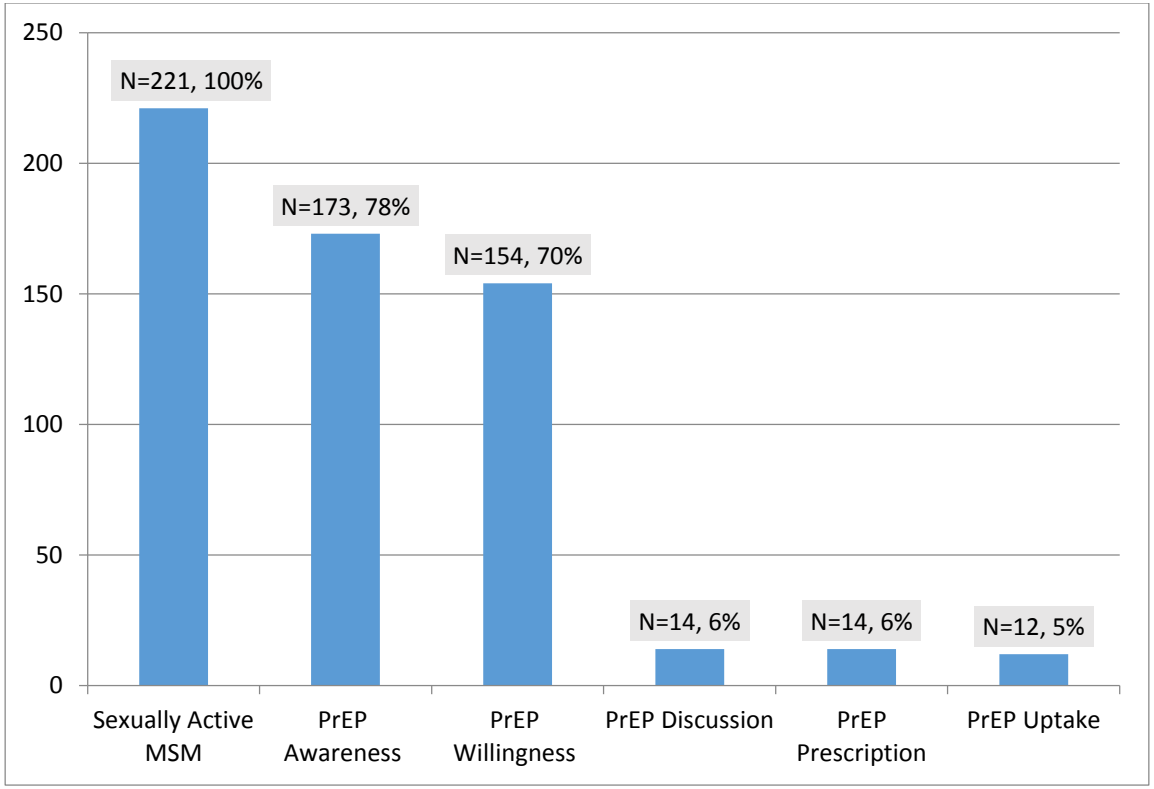

Figure 16: The PrEP care continuum for Texas

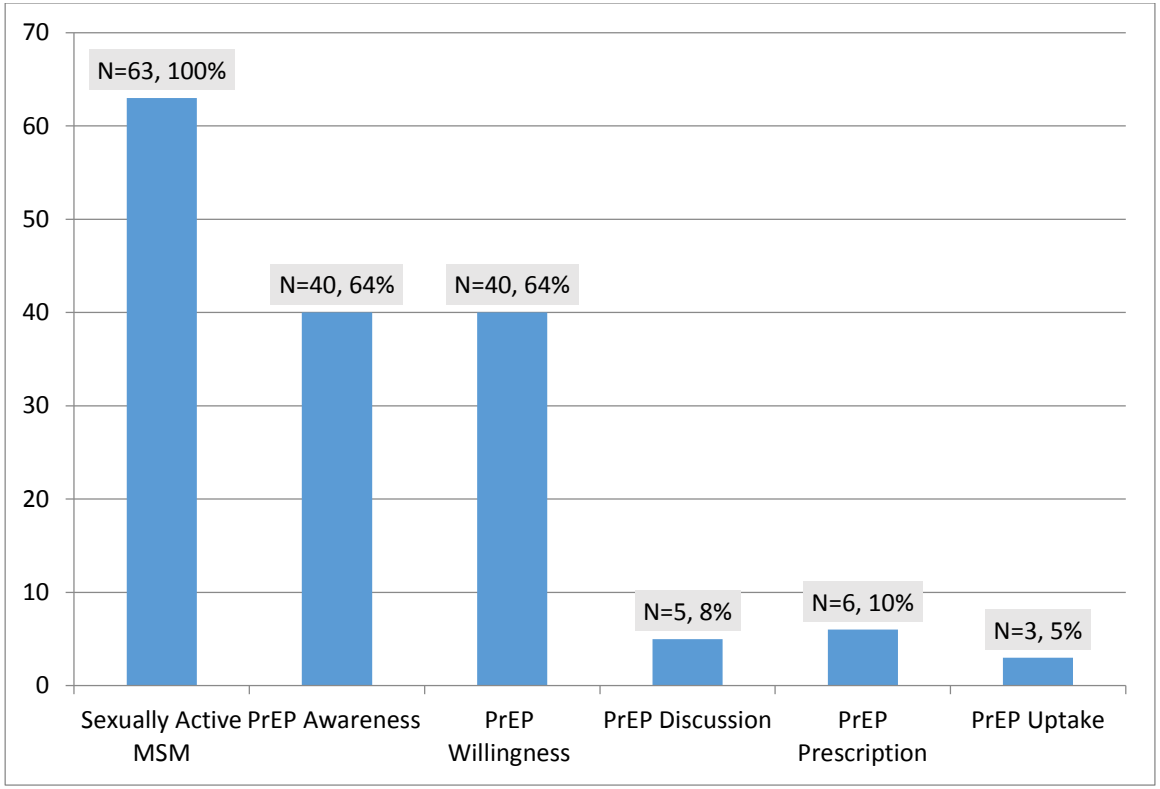

Figure 17: The PrEP care continuum for Virginia

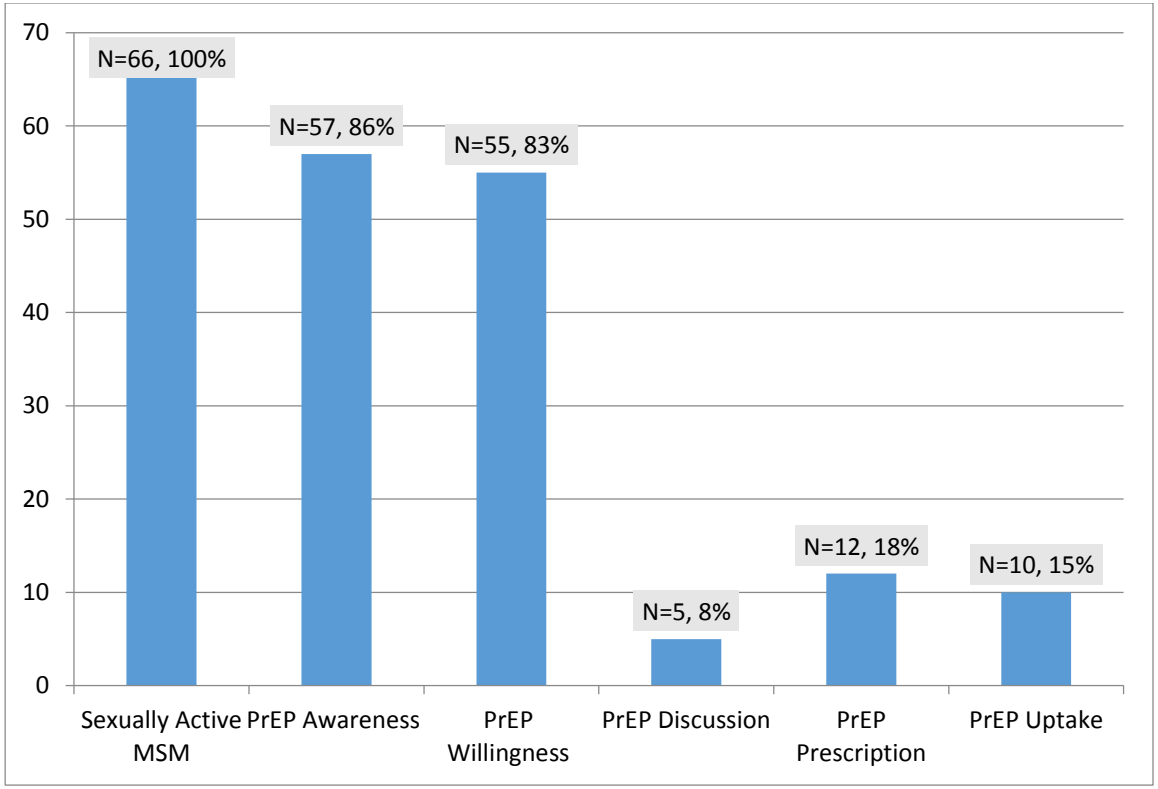

Figure 18: The PrEP care continuum for Washington

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