Sexually transmitted infection testing in the national Veterans Health Administration patient cohort during the COVID-19 pandemic

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Key Points:

The Veterans Affairs system experienced a 24% drop in chlamydia/ gonorrhea testing, a 25% drop in syphilis testing, and a 29% drop in HIV testing in 2020 versus 2019. Initial declines and subsequent improvements in STI testing occurred unequally across age, sex, race, and geographic groups.

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ABSTRACT

Objectives: We performed a retrospective study of chlamydia, gonorrhea, syphilis, and HIV testing in the Veterans Health Administration (VHA) during 2019-2021.

Methods*:* We determined the annual number of chlamydia, gonorrhea, syphilis, and HIV tests from 2019-2021 using electronic health record data. We calculated rates by age, birth sex, race, census region, rurality, HIV status, and use of PrEP .

Results*:* The VHA system experienced a 24% drop in chlamydia/ gonorrhea testing, a 25% drop in syphilis testing, and a 29% drop in HIV testing in 2020 versus 2019. By the conclusion of 2021, testing rates had recovered to 90% of baseline for chlamydia/ gonorrhea, 91% for syphilis, and 88% for HIV.

Declines and subsequent improvements in STI testing occurred unequally across age, sex, race, and geographic groups. Testing for all four STIs in 2021 remained below baseline in rural Veterans. Excluding those <25, women experienced a steeper decline and slower recovery in chlamydia/ gonorrhea testing relative to men, but quicker recovery in HIV testing. Asian Americans and Hawaiian/Pacific Islanders had a steeper decline and a slower recovery in testing for chlamydia/ gonorrhea. Black and White Veterans had slower recovery in HIV testing compared with other race groups. People living with HIV experienced a smaller drop in testing for syphilis compared with people without HIV, followed by a near-total recovery of testing by 2021.

Conclusion: After dramatic reductions from 2019-2020, STI testing rates returned to near-baseline in 2021. Testing recovery lagged in rural, women, Asian American, Hawaiian/Pacific Islander, and Black Veterans.

BACKGROUND

The novel coronavirus disease (COVID-19) pandemic has not only resulted in significant global morbidity and mortality but has also affected the spread of sexually transmitted infections (STIs).[1] While lockdowns and physical distancing policies caused behavioral changes that led to a reduction in sexual contact, the pandemic also interrupted sexual health services and access to care.[2-4] Given the disruptions caused by COVID-19, epidemiological models predict major post-pandemic increases in the incidence of STIs including *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, which are known to disproportionately affect socially vulnerable individuals such as Veterans.[5-8] Not only does the STI epidemic result in human morbidity and mortality, STIs acquired in 2018 alone will cost the American healthcare system nearly $16 billion over time in direct medical costs.[9] These figures are particularly alarming given that in 2019, immediately preceding the pandemic, cases of STIs in the United States (US) reached a new peak for the sixth consecutive year.[9] Similar to trends in the nation as a whole, rates of chlamydia, gonorrhea, and syphilis infection rose among Veterans Health Administration (VHA) patients and reached a 20-year high in 2019. [10, 11]

Despite extensive care interruptions and decreased access to sexual health services, the effects of the COVID-19 pandemic on STI testing in the United States are only partially understood.[5, 12-15] During the pandemic, 91% of federally funded STI programs reported substantial impacts from staff reassignment due to COVID-19 related duties.[16] Multiple studies have reported sharply reduced utilization of sexual health services including a 55% drop in visits to sexual health clinics from 2019 to 2020 in one study in King County, Washington.[17] Rates of notifiable STIs dropped nationally to 50% of 2020 levels for chlamydia, 71% for gonorrhea, and 64% for primary and secondary syphilis, though it remains unclear whether this represents a true drop in infections or a reduction in testing.[18] Based on large laboratory-based studies examining 2019 and 2020 public health data, test positivity rates increased during the early pandemic period for chlamydia and gonorrhea even as the number of tests declined, suggesting that lack of testing is a major driver and asymptomatic cases may be undiagnosed.[14, 15] These prior reports are limited, however, by lack of key covariates such as age, race, and HIV status to inform understanding of where and in whom gaps in testing are occurring.

The first step to addressing STIs in the aftermath of the pandemic is to understand in greater detail how STI testing has changed during the pandemic period. As the largest integrated healthcare system in the US, with varying operating environments and a geographically dispersed patient population, VHA represents an ideal setting to study the nuances in STI testing patterns. We report on rates of STI testing during the pandemic period 2019-2021 among patients in the national VHA system.

METHODS

Data Source

We performed a retrospective cohort study of Veterans receiving VHA care between January 1, 2019 and December 31, 2021. Data were obtained from the VHA Corporate Data Warehouse (CDW), a comprehensive, continually updated repository of information from VHA electronic health records. The CDW data includes health care encounters, laboratory results, medications, diagnoses, and demographics.[19] We defined patients as receiving VHA care in a given calendar year if they had at least one inpatient admission or outpatient visit in that year or the preceding calendar year.

Patient Consent Statement

Because data were obtained and analyzed as part of an operational quality improvement project rather than a systematic investigation designed to develop or contribute to generalizable knowledge, this project was exempt from the requirements of the Common Rule and did not require institutional review board review. Drafting and submission of this manuscript complied with applicable VHA policies (VHA Program Guide 1200.21, *VHA Operations Activities That May Constitute Research*). The study did not include factors necessitating patient consent.

Ascertainment of laboratory screening tests and cases

For each calendar year, we determined the number of chlamydia and gonorrhea tests performed via nucleic acid amplification or antigen detection. The total number of tests for gonorrhea and chlamydia were counted by distinct patient, specimen collection date, and anatomic source such that a patient with 3-site testing (oropharyngeal, genitourinary, and rectal) contributed 3 tests to the totals.

We considered an individual to have received syphilis testing within a given year if a treponemal or nontreponemal test was conducted at least once during the year, regardless of result. We calculated the number of syphilis tests and the number of individuals tested per calendar year. The total number of syphilis tests was counted by distinct patient and specimen collection date. [11]

We considered an individual to have received HIV testing within a given year based on HIV antibody test, regardless of result. We calculated the number of HIV tests and the number of individuals tested per calendar year among people without a known prior diagnosis of HIV as of the start of the year. The total number of HIV tests was counted by distinct patient and specimen collection date.

Patient characteristics

For each calendar year from 2019 to 2021, we calculated descriptive statistics for the demographic characteristics of age, birth sex, self-reported race and ethnicity, census region, rurality, and HIV status. Age was assessed on the first day of the calendar year. Census region and rurality were based on geocoded home address. We defined people with HIV (PWH) as meeting any of the following VHA administrative data criteria: positive HIV antibody combined with positive confirmatory testing, positive HIV viral load, prescribed an HIV antiretroviral medication for ≥31 continuous days within the VHA, or HIV on the patient's problem list (Supplemental Table). We identified all recipients of HIV pre-exposure prophylaxis (PrEP) using a previously validated algorithm that included individuals in VHA care who received at least one >30-day course of tenofovir (either disoproxil fumarate or alafenamide) and emtricitabine during the calendar year in the absence of an HIV diagnosis (Supplemental Table).[20]

RESULTS

Chlamydia and Gonorrhea Testing

In 2019, VHA performed 202,462 chlamydia tests and 201,273 gonorrhea tests compared with 181,118 (11% decline) and 180,310 (10% decline) in 2021, respectively (Table 1). Rates of chlamydia and gonorrhea testing, including population subgroups defined by age, birth sex, race/ ethnicity, geography, HIV status, and receipt of PrEP, are reported for 2019, 2020, and 2021 (Tables 2-4). The rate of chlamydia/ gonorrhea testing per 100,000 individuals dropped 24% between 2019 and 2020. Veterans aged 35-44 experienced a 26% drop in testing, the greatest in any age group. Testing in men dropped by 21% compared to 31% for women. The race groups with the biggest decrease include Asian Americans (27%) and Hawaiian and Pacific Islanders (28%). Hispanic and non-Hispanic Veterans had similar decreases in testing of 24%. Testing in rural/ highly rural residents decreased by 28% compared with

23% for urban dwellers. The Northeast census region experienced the biggest drop (29%) among geographic regions followed by the South (26%). PWH experienced a testing drop of 15% compared with 25% for people without HIV. Veterans receiving PrEP experienced a testing drop of 11%.

By 2021, all population groups remained below pre-pandemic testing levels except Veterans aged 18-24 (4% increase relative to 2019) and women younger than 25 (3% increase). Overall testing rates in women recovered to a lesser degree than men (15% vs. 11% below 2019 baseline). The race groups with the least recovery in testing included Asian Americans and Hawaiian and Pacific Islanders (both 14% below baseline). Testing in rural/ highly rural residents remained 17% below baseline compared with 10% for urban dwellers. Veterans living in the Northeast, South, or Midwest had the slowest recovery among geographic regions (16%, 11% and 11% below baseline, respectively). By the end of 2021, no difference was observed in testing rates for people with and without HIV (10% below baseline). Testing in Veterans receiving PrEP remained 10% below baseline in 2021.

Syphilis testing

In 2019, VHA performed 250,732 syphilis tests compared with 226,508 in 2021 (10% decline) (Table 1). Rates of syphilis testing per 100,000, including population subgroups defined by age, birth sex, race/ ethnicity, geography, HIV status, and receipt of PrEP, are reported for 2019, 2020, and 2021 (Tables 2-4). The rate of syphilis testing per 100,000 Veterans dropped 25% between 2019 and 2020. Veterans aged 18-24 experienced the smallest drop (21%). Testing in men and women declined by 25% and 26%, respectively. Asian American and Black Veterans experienced the biggest drops among race groups, 29% and 26%, respectively. Hispanic and non-Hispanic Veterans had a similar testing declines of 26% and 25%. Testing in rural/ highly rural residents dropped by 26% compared with 25% for urban dwellers. The Northeast census region experienced the biggest drop (29%) among geographic regions followed by the South (27%). PWH experienced a 12% drop in testing compared with 27% for people without HIV while those receiving PrEP dropped 5%.

By 2021, all population groups remained below pre-pandemic testing levels except for women under 25 (10% increase) and those receiving PrEP (6%). Testing in women and men recovered to a similar degree (10% below 2019 baseline). Testing among Asian American (14% below baseline) and Black Veterans (12% below baseline) was the slowest to recover. Testing in rural/ highly rural residents remained 12% below baseline compared with 9% for urban dwellers. Veterans living in the Northeast and South had the least recovery among geographic regions (12% and 11% below baseline, respectively). By the end of 2021, syphilis testing in people with HIV was 2% below baseline while people without HIV remained 10% below baseline. Patients receiving PrEP experienced a 6.5% increase in testing rates.

HIV testing

In 2019, VHA performed 474,402 HIV antibody tests compared with 414,469 in 2021 (13% decline) (Table 1). HIV testing rates per 100,000, including population subgroups defined by age, birth sex, race/ ethnicity, geography, HIV status, and receipt of PrEP, are reported for 2019, 2020, and 2021 (Tables 2-4). The rate of HIV testing per 100,000 individuals dropped 29% between 2019 and 2020 and improved to 88% of baseline by 2021.

Black, Multiracial, and Asian American Veterans experienced the biggest drops in 2020 among race groups, 33%, 30%, and 30% respectively. Hispanic and non-Hispanic Veterans had a similar testing declines of 27% and 29%. Testing in rural/ highly rural residents dropped 29%, similar to urban dwellers. The Northeast census region experienced the biggest drop (35%) among geographic regions followed by the Midwest (33%). Patients receiving PrEP experienced a 8% decrease in testing rates in 2020.

By 2021, all population groups remained below pre-pandemic testing levels except for Veterans ages 18-24 who exhibited a 3% increase (10% for women under 25). Testing in women recovered to a greater degree than men but remained below 2019 baseline (-11% and -13%, respectively). Testing among Black Veterans (17% below baseline) was the slowest to recover among race groups, followed by White Veterans (-13%). HIV testing in rural/ highly rural residents remained 15% below baseline compared with 12% for urban dwellers. Patients receiving PrEP experienced a 0.6% increase in HIV testing rates.

DISCUSSION

The COVID-19 pandemic profoundly affected STI testing in the VHA, similar to other settings.[12] From 2019 to 2020, rates of STI testing in the VHA declined by 24% for chlamydia and gonorrhea, 25% for syphilis, and 29% for HIV, an extraordinary decline in a single year and a sharp deviation from the preceding decade of steady gains.[10, 11] National lockdowns and stay home orders in early 2020 affected both access to testing and risk for infection. Total face-to-face visits within VHA dropped by 51.5% in 2020 compared to 2019[21] and laboratory supply shortages in swabs and reagents affected VHA similarly to the US as a whole.[22] Despite these challenges, by the conclusion of 2021, testing rates had recovered to 90% of baseline for chlamydia and gonorrhea, 91% for syphilis, and 88% for HIV.

Declines and subsequent improvements in STI testing occurred unequally across age, sex, race, and geographic groups. As reopening gradually occurred in 2021, several populations appeared to be at higher potential risk for delayed STI testing recovery. Testing for all four STIs in 2021 remained disproportionately below baseline in rural and highly rural Veterans, as well as people living in the Northeast. Women (other than those under age 25) experienced both a steeper decline and a slower recovery in chlamydia/ gonorrhea testing relative to men (Figures 1 and 2) but quicker recovery in HIV testing. Compared with other race groups, Asian Americans and Hawaiian/Pacific Islanders had a steeper decline and a slower recovery in testing for chlamydia/ gonorrhea and Black Veterans had slower recovery in HIV testing. PWH experienced smaller drops in testing for STI testing compared with people without HIV, followed by a near-total recovery of syphilis testing, but gonorrhea and chlamydia testing rates remaining 10% below baseline. Individuals receiving PrEP exhibited higher HIV and syphilis testing rates in 2021 compare with 2019.

Adherence to STI screening guidelines in the US (as well as in VHA) was already suboptimal pre-pandemic despite well-described clinical and public health benefits, with wide variance reported by age, race, and rural/urban residence.[23] For example, in a nationally representative sample of men and women in the US (2017-2019), a higher proportion of individuals aged 20-29 received STI testing compared with those aged 15-19 (12% vs 31%).[22] Black people (42%) were more likely to receive STI testing compared with White people (18%) and individuals living in rural/non-metropolitan areas (19%) were less likely to receive testing as compared with those in major metropolitan areas (27%).[22] Complex socio-cultural and health system factors have been linked to STI testing disparities including healthcare access, local funding for sexual health services, systematic biases affecting historically marginalized groups, medical distrust, and stigma around STIs. Specifically, access to a regular source of care, especially among Black people, is a major structural barrier to STI care.[24, 25] Provider bias may play a role in whether patients receive STI testing.[26] Lack of trust in the medical system may lead certain groups to avoid or delay preventative care, especially sexual healthcare.[27-29] The COVID-19 pandemic amplified existing health care challenges that disproportionately impact socially vulnerable groups who continue to be most affected by STIs. COVID-19-related disruptions especially impacted women, including loss of employment or childcare, and may have deterred STI screening requiring an office visit. Fear of COVID-19 exposure and limited clinic appointments led to fewer in-person medical appointments where STI testing might have been obtained.[30] This is one likely explanation why testing recovered faster for chlamydia and gonorrhea, which do not require phlebotomy, compared with syphilis and HIV.

In 2020, the first STI National Strategic Plan was published to systematically address the STI epidemic in the US.[23] Additional evaluation will be needed to determine whether reductions in STI testing during the pandemic represent lasting changes in risk behavior, or, more likely, changes in access to STI testing. To achieve the goals outlined in the STI National Strategic Plan, further study will be necessary to understand the effects of the COVID-19 pandemic on the STI care continuum including linkage to treatment and PrEP. Future work using VA data could be undertaken to investigate early reports that lower PrEP use during the pandemic may be linked to increased HIV incidence in high-risk groups.[31] Although the current study lacks the necessary data to examine STI testing in groups with specific sexual risks, we note that HIV testing in Veterans receiving PrEP in 2021 surpassed 2019 levels.

Our study has several important limitations that should inform interpretation of our findings. We lacked information regarding sexual orientation or individual sexual risk behaviors, precluding assessment of testing rates in several groups with known high prevalence of STIs. Our analysis was limited to users of the VHA healthcare system and to STI tests performed within VHA, potentially restricting generalizability, although prior work in VHA populations has demonstrated parallel STI trends compared to the general US.[10, 11] Finally, while VHA data has overall low levels of missingness for most variables, 9.3% of our cohort was missing data for race.

CONCLUSIONS

Despite dramatic reduction in the use of STI testing from 2019 to 2020 in the national VHA system during the COVID-19 pandemic, 2021 testing rates for chlamydia, gonorrhea, syphilis, and HIV approached baseline levels. However, recovery occurred unevenly in some patient groups and across different STIs, most notably leaving rural, women, Black, Asian American, and Hawaiian/Pacific Islander Veterans at risk for disparities. Encouragingly, chlamydia and gonorrhea testing rates in Veterans under age 25 years (particularly women), syphilis testing in Veterans with HIV and those receiving PrEP, and HIV testing in Veterans receiving PrEP have all reached or exceeded pre-pandemic levels. Our findings highlight the need to ensure a broader and more equitable recovery of STI testing in order to meet the goals outlined in the STI National Strategic Plan.

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Table 1. Number of Chlamydia, Gonorrhea, HIV, and Syphilis tests performed in VHA facilities[1]

	Veterans in care N	**Chlamydia tests N (% of Veterans tested)**	**Gonorrhea tests N (% of Veterans tested)**	**HIV antibody tests N (% of Veterans tested[2])**	**Syphilis tests N (% of Veterans tested)**
2019	6,720,302	202,462 (2.3%)	201,273 (2.3%)	474,402 (6.6%)	250,732 (3.2%)
2020	6,606,172	151,491 (1.8%)	150,617 (1.8%)	331,470 (4.7%)	184,792 (2.4%)
2021	6,695,168	181,118 (2.1%)	180,310 (2.1%)	414,469 (5.7%)	226,508 (2.9%)

[1] Individuals may have more than one test during the year.

[2] The numbers of Veterans in care who are not living with HIV at the start of the year are used as the denominators to calculate the percent of Veterans tested for HIV.

Table 2: Testing rates for Chlamydia, Gonorrhea, HIV and Syphilis in VHA patients (2019)

		Veterans in care (N)	**Chlamydia (tests per 100,000)**	**Gonorrhea (tests per 100,000)**	**HIV[1] (tests per 100,000)**	**Syphilis (tests per 100,000)**
All	All	6,720,302	3,013	2,995	7,092	3,731
Age	18-24	74,855	14,067	14,004	18,656	9,907
	25-34	573,899	11,566	11,514	15,128	8,568
	35-44	639,174	7,586	7,551	12,123	6,276
	45-54	799,668	4,044	4,019	9,849	4,525
	55-64	1,163,104	2,434	2,424	8,480	4,179
	65+	3,469,388	472	463	3,491	1,991
Birth sex	Female	588,362	10,886	10,865	11,570	5,794
	Male	6,131,940	2,257	2,240	6,661	3,533
Race	Asian American	76,816	4,940	4,909	9,859	4,726
	Black	1,138,138	7,049	7,022	12,692	7,465
	Hawaiian/ Pacific Islander	57,212	3,620	3,587	7,891	3,978
	Multiracial	59,555	6,214	6,181	10,449	6,073
	Native American	52,210	3,714	3,700	7,515	4,003
	White	4,808,654	2,016	2,001	5,806	2,876
	Unknown	527,717	2,609	2,600	5,962	3,009
Hispanic	Yes	440,455	5,645	5,541	10,537	6,514
	No	6,279,847	2,828	2,816	6,851	3,536
Rurality	Urban	4,267,475	3,870	3,846	8,045	4,576
	Rural/ Highly Rural	2,261,089	1,481	1,475	5,373	2,119
	Unknown	191,738	2,001	1,991	6,242	3,922
Census region	West	1,352,211	3,704	3,676	6,727	4,234

	Midwest	1,411,342	1,975	1,981	5,303	2,337
	South	2,937,406	3,409	3,389	8,340	4,221
	Northeast	802,539	2,688	2,689	6,665	3,330
	Other	60,671	1,108	554	6,293	6,949
	Unknown	156,133	1,369	1,366	5,522	3,562
HIV	HIV+	32,779	65,255	64,874	N/A	88,892
	HIV-	6,687,523	2,708	2,692	7,092	3,314
Female <25 years		17,259	27,759	27,713	21,044	11,791
PrEP during CY		3,843	350,247	346,266	269,100	224,668

[1]The numbers of Veterans in care who are not living with HIV at the start of the year are used as the denominators to calculate rates of HIV testing.

Table 3: Testing rates for Chlamydia, Gonorrhea, HIV and Syphilis in VHA patients (2020)

		Veterans in care (N)	**Chlamydia (tests per 100,000)**	**Gonorrhea (tests per 100,000)**	**HIV[1] (tests per 100,000)**	**Syphilis (tests per 100,000)**
All	All	6,606,172	2,293	2,280	5,042	2,797
Age	18-24	65,329	11,741	11,710	14,562	7,848
	25-34	545,142	8,773	8,726	10,880	6,521
	35-44	668,796	5,652	5,622	8,573	4,706
	45-54	781,802	3,058	3,038	6,964	3,381
	55-64	1,130,430	1,914	1,906	5,895	3,129
	65+	3,414,616	370	366	2,518	1,489
Birth sex	Female	600,918	7,474	7,456	8,214	4,302
	Male	6,005,253	1,775	1,762	4,723	2,647
Race	Asian American	78,808	3,581	3,529	6,949	3,366
	Black	1,132,626	5,257	5,240	8,521	5,504
	Hawaiian/ Pacific Islander	57,355	2,617	2,593	5,897	3,180

	Multiracial	60,130	4,911	4,888	7,358	4,565
	Native American	51,531	2,878	2,864	5,544	3,121
	White	4,702,426	1,529	1,517	4,159	2,149
	Unknown	523,296	2,161	2,150	4,831	2,402
Hispanic	Yes	445,395	4,310	4,247	7,673	4,842
	No	6,160,777	2,147	2,138	4,852	2,649
Rurality	Urban	4,219,776	2,959	2,940	5,703	3,442
	Rural/ Highly Rural	2,221,609	1,072	1,070	3,813	1,558
	Unknown	164,787	1,702	1,692	4,759	3,001
Census region	West	1,344,364	2,946	2,914	5,266	3,381
	Midwest	1,378,491	1,549	1,551	3,569	1,853
	South	2,915,964	2,530	2,520	5,883	3,059
	Northeast	780,623	1,914	1,913	4,305	2,349
	Other	59,663	682	375	4,605	4,852
	Unknown	127,067	1,116	1,112	4,130	2,659
HIV	HIV+	32,806	55,365	55,155	N/A	78,129
	HIV-	6,573,366	2,028	2,016	5,042	2,421
Female <25 years		15,592	22,685	22,666	17,624	10,166
PrEP during CY		4,312	311,271	303,502	246,586	213,776

[1]The numbers of Veterans in care who are not living with HIV at the start of the year are used as the denominators to calculate rates of HIV testing.

Table 4: Testing rates for Chlamydia, Gonorrhea, HIV and Syphilis in VHA patients (2021)

		Veterans in care (N)	Chlamydia (tests per 100,000)	Gonorrhea (tests per 100,000)	HIV[1] (tests per 100,000)	Syphilis (tests per 100,000)
All	All	6,695,168	2,705	2,693	6,220	3,383
Age	18-24	63,001	14,665	14,641	19,146	9,757
	25-34	532,862	10,475	10,431	13,956	7,920
	35-44	722,120	6,684	6,647	10,732	5,662
	45-54	796,311	3,519	3,499	8,490	3,868
	55-64	1,135,498	2,189	2,177	6,976	3,638
	65+	3,445,340	433	433	3,073	1,891
Birth sex	Female	636,515	9,289	9,255	10,244	5,212
	Male	6,058,652	2,014	2,004	5,796	3,191
Race	Asian American	83,652	4,263	4,212	8,866	4,085
	Black	1,152,826	6,244	6,220	10,530	6,601
	Hawaiian/ Pacific Islander	58,342	3,106	3,061	7,397	3,699
	Multiracial	62,706	5,768	5,735	9,541	5,644
	Native American	51,757	3,476	3,462	7,150	3,797
	White	4,706,272	1,769	1,761	5,068	2,593
	Unknown	579,613	2,606	2,593	6,153	2,983
Hispanic	Yes	447,001	5,062	5,022	9,028	5,917
	No	6,248,167	2,537	2,527	6,020	3,202
Rurality	Urban	4,335,444	3,477	3,459	7,100	4,161
	Rural/ Highly Rural	2,221,586	1,229	1,230	4,553	1,857
	Unknown	138,138	2,212	2,206	5,539	3,531
Census region	West	1,378,249	3,392	3,339	6,316	4,031

	Midwest	1,385,234	1,754	1,740	4,380	2,154
	South	2,975,789	3,033	3,032	7,355	3,746
	Northeast	798,805	2,264	2,283	5,410	2,922
	Other	59,749	700	700	4,408	5,990
	Unknown	97,342	1,345	1,339	4,217	2,797
HIV	HIV+	33,053	58,570	58,367	N/A	87,218
	HIV-	6,662,115	2,428	2,417	6,220	2,967
Female <25 years		15,490	28,728	28,741	23,139	12,931
PrEP during CY		5,021	313,961	302,569	270,662	239,195

[1]The numbers of Veterans in care who are not living with HIV at the start of the year are used as the denominators to calculate rates of HIV testing.

Figure legends

Figure 1. Chlamydia, gonorrhea, HIV and syphilis tests per 100,000 Veterans by birth sex in VHA, 2019-2021

Figure 2. Percent change in rate of testing for chlamydia, gonorrhea, HIV and syphilis in VHA in 2020 and 2021 versus 2019

Legend: Presented as percent change in STI testing rates per 100,000 for each year relative to 2019. Please refer to Methods for definitions of stratifying variables (birth sex, age, on PrEP during year, HIV status, race/ ethnicity, rurality, and census region). Abbreviations used for race/ ethnicity: Hisp=Hispanic ethnicity, A=Asian American, B=Black, Nat=Native American, PI=Hawaiian/Pacific Islander, W=White, Mult=Multiracial, Unk=Unknown race. Northeast census region abbreviated as NE.

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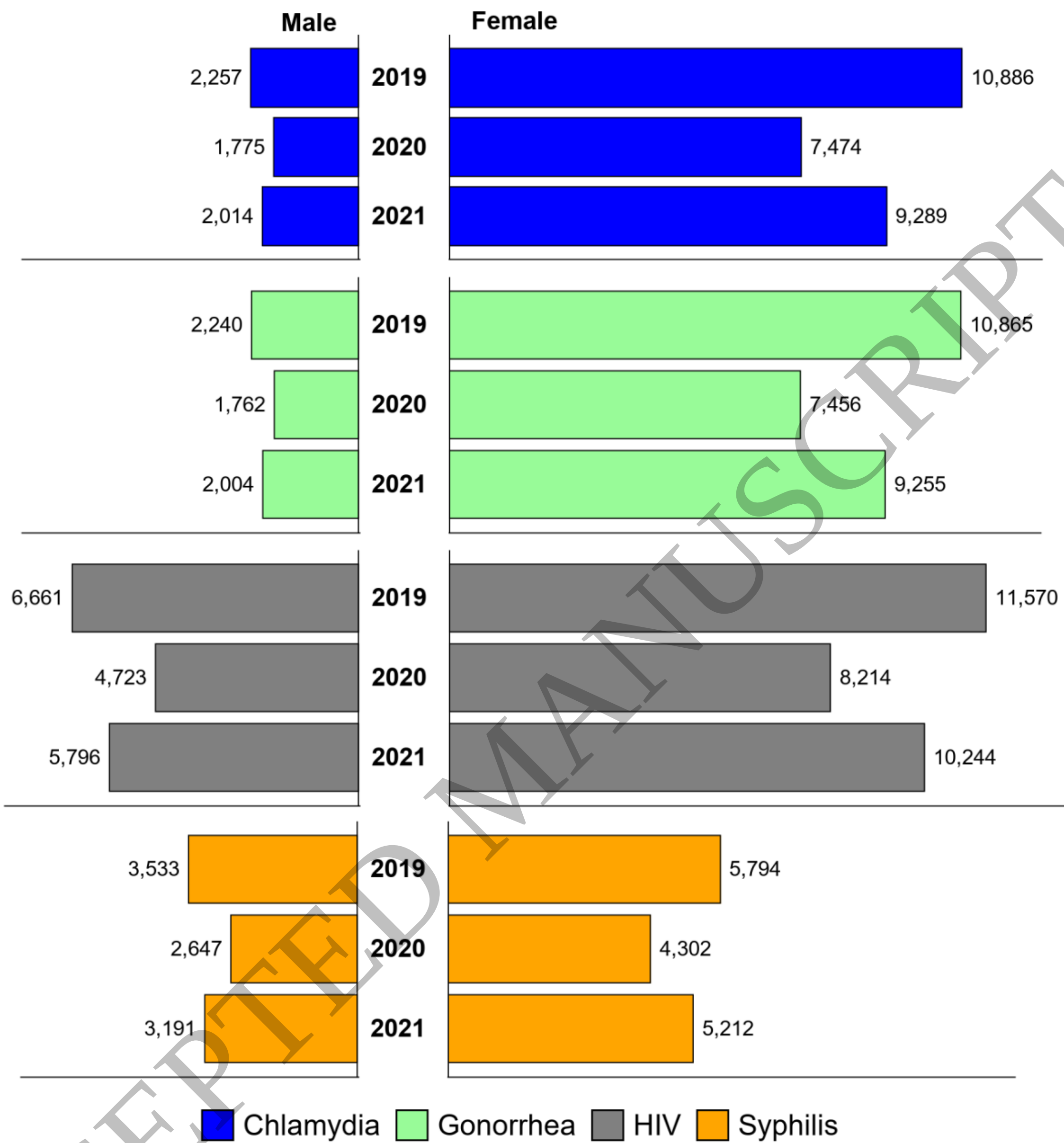
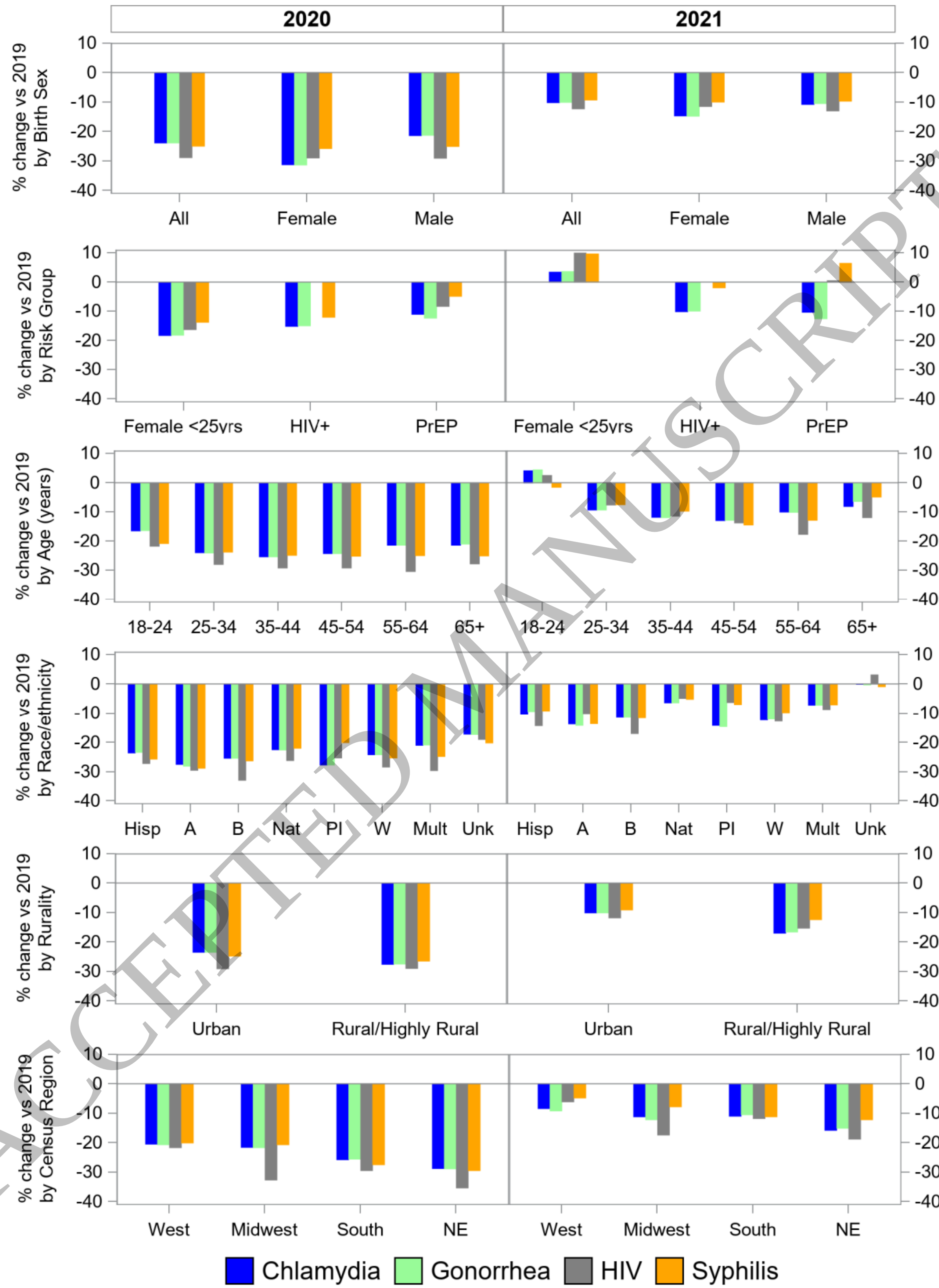


Figure 1
283x378 mm (x DPI)



1

2 **Figure 2**
3 **283x378 mm (x DPI)**