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Access to Healthcare and the Utilization of Sexually Transmitted Infections Among Homeless Medicaid Patients 15 to 44 Years of Age

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Abstract

Homelessness poses a direct threat to public health in the US as many individuals face debilitating health outcomes and barriers to adequate health care. Access to STI care for the homeless Medicaid population of USA has not been well-studied using administrative claims data. Our study aims to compare health services utilization, STI screening and diagnoses among people experiencing homelessness (PEH) vs. those who are non-PEH using ICD10 codes. We used 2019 MarketScan Medicaid claims data to analyze men and women aged 15–44 years with a diagnosis code for PEH (Z59.0), non-PEH (without Z59.0) and assessed their emergency department and outpatient visits and STI/HIV diagnoses and screening rates. We identified 5135 PEH men and 3571 PEH women among 1.3 million men and 2.1 million women in the 2019 US Medicaid database. PEH patients were more likely to have ED visits (94.80% vs 33.04%) and ≥ 20 outpatient clinic visits (60.29% vs 16.16%) than non-PEH patients in 2019. Higher diagnoses were observed for syphilis 1.57% (CI 1.32–1.86) vs 0.11% (CI 0.11–0.11), HIV 3.93% (CI 3.53–4.36) vs 0.41% (CI 0.41–0.42), chlamydia 1.94% (CI 1.66–2.25) vs 0.85% (CI 0.84–0.86) and gonorrhea 1.26% (CI 1.04–1.52) vs. 0.33% (CI 0.33–0.34) ($p < 0.0001$) among PEH compared to non-PEH. Among PEH, higher STI/HIV diagnoses rates indicate an increase in STI burden and suboptimal STI testing indicates an underutilization of STI services despite having a higher

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Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval We further confirm that existing data sets in this study use de-identified patient medical records and therefore, Institutional Review Board (IRB) recognizes such research which may not meet the definition of “human subjects” research requiring IRB review.

Consent to Participate This study involved analyses of Health Insurance Portability and Accountability Act-compliant secondary databases, Truven Healthcare Analytics, MarketScan, thus no informed consent was feasible or necessary.

Consent for Publication Neither the article nor portions of it have been previously published elsewhere (except as an abstract of this manuscript is accepted as poster presentation at 2022 STI Prevention Conference). The manuscript is not under consideration for publication in another journal, and will not be submitted elsewhere until the Journal of Community Health editorial process is completed, and a final decision on approval or disapproval has been made. All authors consent to the publication of the manuscript in the Journal of Community Health, should the article be accepted by the Editor-in-chief upon completion of the refereeing process.

Code Availability Once data permission is granted by Truven Health Analytics, code may be available upon reasonable request.

percentage of health care visits compared to non-PEH patients. Focused STI/HIV interventions are needed to address health care needs of PEH patients.

Keywords

Homeless; Testing; STIs; Diagnosis; Medicaid

Sexually transmitted infections (STIs) and homelessness are preventable public health challenges that appear irremediable. Recent national estimates suggest there are approximately 568,000 people (0.2%) experiencing homelessness (PEH) in the U.S. on a given night, with 63% staying at sheltered locations and 37% staying at unsheltered places such as streets, abandoned buildings or unhabitable places. Among them, 35,000 (6.2%) were unaccompanied youth experiencing homelessness under the age of 25 years, one-fifth (n = 6615) of them were under the age of 18) [1]. Men or boys comprised of about 61% and women or girls were 39% among PEH population [1]. PEH population comprised of 48% were whites, 40% black or African American and 22% Hispanic or Latino [1].

A systemic literature review of studies between 2000 and 2016 of adult PEH revealed sexually transmitted infections were about 2.1–52.5% among adult PEH [2]. As in national-level case report data, chlamydia or gonorrhea prevalence rates was higher (7.8%) among younger adult women experiencing homelessness in family shelters than single women experiencing homelessness [2, 3]. Other risk factors such as injection and non-injection substance use, alcohol or drug abuse, homelessness severity (number of years or episodes), history of incarceration, and intimate partner violence were markers of higher STI occurrence among PEH population [2, 4]. A study performed among PEH and unstably housed women suggested 44–65% reported condom-less sex between 6 months prior to and throughout study period [5]. Condom-less sex among homeless women with HIV was associated with less than daily use of substances vs. no use of alcohol and cannabis compared to the homeless women without HIV [5].

Condom-less sex among women without HIV was also significantly higher among those who reported less than daily use of methamphetamines, having panic attacks and PEH [5]. A study in Hollywood, CA found high rates of survival sex, attempted suicide and childhood physical abuse [6].

According to the recommendations from the Centers for Disease Control and Prevention (CDC) Sexually Transmitted Infections (STIs) treatment guidelines and the US Preventive Services Task Force, all sexually active women aged ≤ 24 years, all sexually active women at increased risk ≥ 25 years should receive annual screening for chlamydia and gonorrhea [7, 8]. Screening for syphilis should be provided for all pregnant women at the 1st prenatal visit and retested early in the 3rd trimester and at the time of delivery if at higher risk [7, 8]. Sexually active men having sex with men should be screened at least annually and every 3–6 months if at increased risk [7, 8]. Although, no specific screening guidelines are indicated for PEH, lack of access to care and exposures to risk factors such as survival sex, condom-less sex, physical or sexual violence, and injection or non-injection substance abuse, may place PEH in a category of high risk for STI/HIV infection. With these vulnerabilities

in mind, screening all persons at increased risk for chlamydia, gonorrhea, and syphilis is applicable [7, 8].

To understand the STI burden on PEH, we examine the STI screening and diagnoses data reported in 2019 Medicaid administrative claims. People facing homelessness or who are unstably housed may have various morbidities and experience disproportionately accessed health care. They may have many healthcare visits, but still face the inadequate health care access and debilitating health outcomes. The Affordable Care Act (ACA) of 2010 provided opportunities for PEH to be enrolled in either Medicaid using extremely low income eligibility criteria or using the Health Insurance Marketplace (www.healthcare.gov) to obtain affordable private health insurance via low income tax credits available for families under 100% up to 400% of the Federal Poverty Level [9, 10]. Since STI service utilization among homeless populations using ICD10 codes in Medicaid administrative claims data has not been fully examined, we aimed: (1) to assess the prevalence of PEH stratified by gender, age group and race/ethnicity, (2) to compare PEH's healthcare utilization at emergency departments and outpatient clinics to non-PEH counterparts, and (3) to estimate STI screening and diagnoses among PEH vs non-PEH by gender, age group, race/ethnicity.

Methods

For this study, we utilized the 2019 Truven Health MarketScan® Medicaid claims database which includes approximately 7 million Medicaid enrollees aged 15–44 years from 12 to 13 unidentified states. Medicaid claims data include de-identified patients health care services claims information such as inpatient, and outpatient visit encounters, dates of service visits, patient demographics (e.g. age, sex, race/ethnicity), place of service, International Classification of Disease, Tenth Revision (ICD-10) diagnosis codes, Current Procedural Terminology codes (CPT), outpatient pharmaceutical use, provider details, and reimbursement information [11]. Due to the use of de-identified patient data, an IRB review is deemed unnecessary from CDC's Institutional Review Board (IRB) [12]. We included both men and women aged 15–44 years if they had ≥ 11 months of Medicaid enrollment and had at least one claim for an office visit or emergency department (ED) visits in 2019. For this study, we identified "Z code" from a broader range of Z00–Z99 that specifically emphasize on factors that may be influencing health status and provide specific information surrounding patient's health care and treatment and these codes were originally implemented by the Centers of Medicare and Medicaid Services (CMS) on October 1, 2015 [13–16]. Of these individuals, persons were defined as "PEH" if they had a PEH diagnosis code (Z59.0) in 2019 excluding Z59.0× and Z59.1–Z59.9 [13] and as "non-PEH" if they had no PEH diagnosis code (Z59.0) in 2019. To assess health care access and utilization, we identified the average encounters of any office visits and ED visits among PEH and compared it with the average encounters of any office visits and ED visits of non-PEH individuals. Among PEH, we further assessed STI/HIV diagnosis and annual testing rates for chlamydia, gonorrhea, syphilis, and HIV. HIV testing was estimated only for those without HIV diagnosis in 2019. To determine STI diagnoses, we used ICD-10 codes to identify patients with the highest burden of STIs: chlamydia, gonorrhea, syphilis or HIV diagnosis [17]. We used CPT codes to identify patients who were tested for chlamydia, gonorrhea, syphilis or HIV [18]. Finally, we also examined the average number of office

visits and ED visits among PEH and non-PEH individuals. Annual screening for STI may or may not have been done during ED visit.

We used SAS software version 9.4 (SAS Institute, Cary, NC, USA) and employed chi-square bivariate data analysis in this study. STI/HIV testing and diagnosis frequencies and 95% confidence intervals were calculated by gender, age group, and race/ethnicity. A 95% confidence interval and alpha level of $p < 0.05$ were used to identify statistically significant STI testing and diagnoses differences by respective categorical variable.

Results

Among 5.1 million patients enrolled in the MarketScan Medicaid database, 3.4 million patients aged 15–44 years had coverage of ≥ 11 months and had at least one medical claim at an outpatient or ED in 2019. Among 3.4 million patients (1.3 million men and 2.1 million women), 5135 men (0.15%) and 3571 women (0.10%) experienced homelessness (with Z59.0 ICD-10 CM code) (Table 1). Compared to non-PEH patients, PEH were more likely to be older. Upon evaluating access to health services among PEH and non-PEH patients, we found that 94.80% of PEH vs 33.04% of non-PEH patients had ED visit and 60.29% of PEH and 16.16% of non-PEH patients had ≥ 21 outpatient clinic visits in 2019. We also identified 3184 (89.2%) sexually active women among 3571 PEH women and 965,483 (45.3%) sexually active women among non-PEH female population.

Compared to non-PEH patients among 15–44 years old, PEH had significantly higher syphilis diagnoses 1.57% (CI 1.32–1.86) vs 0.11% (CI 0.11–0.11), HIV 3.93% (CI 3.53–4.36) vs 0.41% (CI 0.41–0.42), chlamydia 1.94% (CI 1.66–2.25) vs 0.85% (CI 0.84–0.86) and gonorrhea 1.26% (CI 1.04–1.52) vs. 0.33% (CI 0.33–0.34) ($p < 0.0001$) (Fig. 1).

Syphilis diagnoses were significantly higher among PEH than non-PEH patients among sub-population: 1.77% (CI 1.43–2.17) vs. 0.13% (CI 0.12–0.14) among men, 1.69% (CI 1.22–2.29) vs. 0.17% (CI 0.17–0.18) in Black/African-American, aged 30–34 years 2.13% (CI 1.53–2.88) vs. 0.16% (CI 0.15–0.17) in patients aged 30–34 years, 1.64% (CI 1.37–1.93) vs. 0.23% (CI 0.22–0.24) in patients who had ER visits in 2019, and 2.31% (CI 1.92–2.75) vs. 0.28% (CI 0.27–0.30) in patients who had ≥ 21 visits in 2019 ($p < 0.0001$). Chlamydia diagnoses were significantly higher among PEH than non-PEH patients among sub-population: 3.84% (CI 3.23–4.52) vs. 1.24% (CI 1.23–1.26) in women, and 6.08% (CI 4.17–8.52) vs. 1.02% (CI 1.00–1.04) in patients aged 15–19 years ($p < 0.0001$), respectively.

Women between the ages of 15–44 years who experienced homelessness, and covered by Medicaid compared to non-PEH counterparts were more likely to be screened for chlamydia 47.4% (CI 45.76–49.06) vs 22.3% (CI 22.22–22.33) ($p < 0.0001$), for gonorrhea 57.5% (CI 55.85–59.12) vs 27.4% (CI 27.34–27.46) ($p < 0.0001$), for syphilis 32.0% (CI 30.48–33.57) vs 12.0% (CI 11.95–12.04) ($p < 0.0001$) and for HIV 35.5% (CI 33.91–37.07) vs 11.8% (CI 11.77–11.86) ($p < 0.0001$), respectively. Black/African-American PEH than Black/African-American non-PEH patients were more likely to be screened for chlamydia 37.79% (CI 35.85–39.75) vs 20.46% (CI 20.39–20.54) ($p < 0.0001$), for gonorrhea 43.77% (CI 41.78–45.77) vs 23.39% (CI 23.31–23.47) ($p < 0.0001$), for syphilis 27.93% (CI 26.15–

29.76) vs 11.05% (CI 10.99–11.11) ($p < 0.0001$) and 31.68% (CI 29.83–33.58) vs 11.82% (CI 11.76–11.88) ($p < 0.0001$) (Tables 2, 3).

Among sexually active women, aged 15–24 years, overall chlamydia and gonorrhea diagnosis and screening rates among those who were PEH were higher compared to non-PEH sexually active women of the same age group (8.56% vs. 4.41%) for chlamydia diagnosis, (4.08% vs. 1.43%) for gonorrhea diagnosis, (66.58% vs. 54.10%) for chlamydia screening, and (73.64% vs. 61.68%) for gonorrhea screening (Fig. 2). Among sexually active women aged 15–19 years, PEH, compared to non-PEH patients, had significant higher chlamydia diagnoses (10.00% vs 4.42%), and lower gonorrhea diagnoses (3.60% vs 1.34%). Among PEH and non-PEH sexually active patients aged 15–24 years who had an ED visit in 2019, diagnoses rates were 8.66% vs 5.18% for chlamydia, 4.18% vs 1.76% for gonorrhea and among those with ≥ 21 outpatient clinic visits in 2019, diagnoses rate was 9.46% vs 5.43% for chlamydia, and 4.05% vs 1.73% for gonorrhea, respectively.

Discussion

Previous studies have shown that, as a key social determinant of health (SDOH), homelessness leads to poor psychological and physical health outcomes [19] and results in higher rates of hospitalization [20]. Our study also showed that over 90% of PEH sought or received care in the ED, compared to 33% of non-PEH persons, and over 60% of PEH had ≥ 21 outpatient clinic visits compared to 16% of non-PEH persons. Our results of higher ED and outpatient clinic visits among PEH may indicate poor health quality among this population. With greater use of healthcare services, there is an opportunity for STI/HIV screening when this population presents to the ED for other reasons, and ED providers may link PEH to primary care providers for continue care and other prevention services [21, 22].

The experience of homelessness is associated with high STI prevalence [2], even among people with health insurance and health care service access. PEH, specifically for many subgroups stratified by age, gender, race/ethnicity, have elevated risk for HIV/AIDS risk behaviors due to injection drug use and risky sexual behaviors [23]. Many studies, according to a systemic review, have shown a high burden of STIs among youth facing homelessness where chlamydia, gonorrhea and syphilis prevalence ranged 6–32% overall, 16.7–46% for girls, and 9–13.1% for boys [24]. Our study also presented evidence that overall STI/HIV diagnoses, especially for syphilis and HIV, were higher among PEH compared to non-PEH persons. Higher diagnoses rates for STI/HIV among PEH are indicative of considerable risk due to disproportionate impact of STIs/HIV among this population. Homelessness may be a key SDOH that may be contributing to increase in increase in the burden of STI/HIV which may require prompt attention and timely STI/HIV screening and treatment [2, 25]. Our findings of elevated risk for STIs/HIV among PEH warrants further investigation and focused interventions and may be a consideration for STI treatment guidance and recommendation for routine STI/HIV monitoring and screening for PEH.

Our study also showed that chlamydia and gonorrhea diagnoses were higher among young sexually active PEH women compared to sexually active non-PEH women and annual chlamydia and gonorrhea testing among young sexually active PEH women was suboptimal.

According to the Healthcare Effectiveness Data and Information Set (HEDIS), chlamydia screening measures for Medicaid HMOs, were 58.1% among women aged 16–24 screened for chlamydia in 2018 compared to the 60.2–60.4% chlamydia screening rate we found among PEH sexually-active women aged 15–24 [26]. Because PEH are often exposed to other environmental factors such as substance abuse, survival sex, etc., our study suggests that an opportunity continues to exist for chlamydia and gonorrhea disease monitoring and screening among young sexually active female PEH [2, 4–6].

Our study showed Black/African-American PEH experienced higher STI diagnoses than White PEH. Our results also indicated Black/African-American sexually active women had higher rates of chlamydia and gonorrhea compared to white sexually active women. Similar proportionate differences were also observed for the PEH vs non-PEH sexually active women as well as for men (Fig. 2). There are similar resemblances in STI surveillance report as Black/African-American accounted for 38% of reported gonorrhea cases, 33% of primary and secondary syphilis cases and 42% of new HIV diagnosis [27]. This is indicative of disproportionate impact on Black/African-American population from both homelessness as well as from racial disparity caused by STIs.

There are several strengths of this study. Our study used a large sample from MarketScan administrative claims data to identify rarely found PEH population using ICD-10 CM codes. In addition, our diagnosis rates are similar to what has been previously published in a systemic review of studies between 2000 and 2016 of homeless adults which indicated about 2.1–52.5% for STI among homeless adults [2]. There are several limitations encountered while performing this study. First, our database cannot be generalized to all homeless populations enrolled in Medicaid in the U.S. because MarketScan only included 12–13 unidentified states. There may be variations in how care is provided by state and further detail is unavailable on individual HMO and managed care programs. Without state identification, patients enrolled under Medicaid expansion under ACA were unknown and STI diagnosis and testing between PEH with Medicaid coverage and PEH with Medicaid expansion coverage cannot be compared [9]. Second, our population was restricted to enrollees with ≥ 11 months enrollment in 2019 to ensure consistency in coverage which may have introduced selection bias. Among 11,894 PEH found in MarketScan, 8706 (0.25%) determined to have enrolled for ≥ 11 months and 3188 (0.19%) for < 11 months. Third, providers may not be familiar with reimbursement for the services rendered to homeless populations under the guidelines of ACA and our study might underestimate the number of PEH because we only identified 0.15% male PEH and 0.10% female PEH, compared to total percentage of homeless people (0.20%) in the U.S. [1]. Although men were more likely to experience homeless than women in our study, the proportion of PEH who were male (58.98%) in this study was lower than recently reported (69.6%) by the U.S. Department of Housing and Urban Development (HUD) [28]. Fourth, our data-source may be marred with inherited administrative errors, incomplete patient records, inaccurate data, missing services if delivered at non-profit, faith based charity or non-Medicaid affiliated free of cost facility, and individuals' specific risk factors such as substance abuse or risky sex behavior information [26, 27]. Fifth, MarketScan doesn't have lab results which could have been used to confirm STI diagnosis [29]. Finally, our data may have underestimated the PEH population in MarketScan data due to underuse of Z codes by providers as indicated by

other studies [30–33]. Z codes have been implanted by CMS since 2015 primarily to capture information related to social determinants of health [13, 14].

Our study presents a glimpse of some successes and opportunities for the forgotten public health issue: STI/HIV burden among PEH. STI/HIV diagnoses and screening were higher among both men and women experiencing homelessness compared to non-PEH individuals. With a high prevalence for STI diagnosis and suboptimal STI testing among PEH, our study indicates there are opportunities for improvement in STI care for PEH. Future studies should identify interventions that directly target homeless populations addressing their unmet health care needs and ideas on methods to better provide recommended STI/HIV screening and treatment to reduce burden of STIs for in this population.

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Data Availability

The data that support the findings of this study are available from IBM Truven Health Analytics but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however may be available with permission of IBM Truven Health Analytics.

References

1. U.S Department of Housing and Urban Development. (2020). 2019 AHAR: Part 1—PIT estimates of homelessness in the U.S. U.S. Department of Housing and Urban Development.
2. Williams SP, & Bryant KL (2018). Sexually transmitted infection prevalence among homeless adults in the United States: A systematic literature review. Sexually Transmitted Diseases, 45(7), 494–504. 10.1097/olq.0000000000000780 (In Eng). [PubMed: 29465661]
3. Caton CL, El-Bassel N, Gelman A, Barrow S, Herman D, Hsu E, Tochterman AZ, Johnson K, & Felix A (2013). Rates and correlates of HIV and STI infection among homeless women. AIDS and Behavior, 17(3), 856–64. 10.1007/s10461-012-0198-x (In Eng). [PubMed: 22610369]
4. Montgomery AE, Szymkowiak D, Marcus J, Howard P, & Culhane DP (2016). Homelessness, unsheltered status, and risk factors for mortality: Findings from the 100,000 homes Campaign. Public Health Reports (Washington, DC: 1974), 131(6), 765–772. 10.1177/0033354916667501 (In Eng).
5. Meacham MC, Bahorik AL, Shumway M, Marquez C, & Riley ED (2019). Condomless sex and psychiatric comorbidity in the context of constrained survival choices: A longitudinal study among homeless and unstably housed women. AIDS and Behavior, 23(3), 802–812. 10.1007/s10461-018-2280-5 (In Eng). [PubMed: 30267368]
6. Warf CW, Clark LF, Desai M, Rabinovitz SJ, Agahi G, Calvo R, & Hoffmann J (2013). Coming of age on the streets: Survival sex among homeless young women in Hollywood. Journal of Adolescence, 36(6), 1205–1213. 10.1016/j.adolescence.2013.08.013 [PubMed: 24215967]
7. Workowski KA, & Bolan GA (2015). Sexually transmitted diseases treatment guidelines, 2015. MMWR Recommendations and Reports, 64(RR-03), 1–137. (In Eng).
8. LeFevre ML, US Preventive Services Task Force. (2014). Screening for chlamydia and gonorrhea: U.S. Preventive Services Task Force recommendation statement. Annals of Internal Medicine, 161(12), 902–10. 10.7326/M14-1981 [PubMed: 25243785]

9. Patient Protection and Affordable Care Act. (2010). Patient protection and affordable care act. Public Law, 111(48), 759–762. https://www.congress.gov/111/plaws/publ148/PLAW-111publ148.pdf
10. Rosenbaum S (2011). The Patient Protection and Affordable Care Act: Implications for public health policy and practice. Public Health Reports (Washington, DC: 1974), 126(1), 130–135. 10.1177/003335491112600118 (In Eng).
11. Hansen L (2012). CS. White Paper—Health research data for the real world: The MarketScan Databases. Truven Health Analytics. http://truvenhealth.com/portals/0/assets/PH_11238_0612_TEMP_MarketScan_WP_FINAL.pdf. Accessed June 2021.
12. Truven Health Analytics Inc. (2016). MarketScan databases user guide and database dictionary. Multi-state Medicaid Database. Truven Health Analytics Inc.
13. Dapkins I, & Blecker SB (2021). Homelessness and Medicaid churn. Ethnicity & Disease, 31(1), 89–96. 10.18865/ed.31.1.89 (In Eng). [PubMed: 33519159]
14. Maksut JLHC, Van CD, Razmi A, & Khau MT (2021). Utilization of Z codes for social determinants of health among Medicare fee-for-service beneficiaries, 2019. Office of Minority Health (OMH), Centers for Medicare and Medicaid Services (CMS). https://www.cms.gov/files/document/z-codes-data-highlight.pdf
15. Centers for Medicare & Medicaid Services. (2015). Use ICD-10 now—Here's how. Centers for Medicare & Medicaid Services. https://www.cms.gov/Medicare/Coding/ICD10/Downloads/ICD10ListservUseICD10Infographic.pdf. Accessed June 2021.
16. Centers for Medicare & Medicaid Services. (2015). ICD-10. Centers for Medicare & Medicaid Services. https://www.cms.gov/Medicare/Coding/ICD10. Accessed June 2021.
17. World Health Organization. (2015). International statistical classification of diseases and related health problems (10th revision, Fifth edition, 2016 ed.). World Health Organization.
18. American Medical Association. (2019). CPT Professional 2020 (CPT/Current Procedural Terminology (Professional Edition)).
19. Zlotnick C, Zerger S, & Wolfe PB (2013). Health care for the homeless: What we have learned in the past 30 years and what's next. American Journal of Public Health. 10.2105/ajph.2013.301586 (In Eng).
20. Kushel MB, Vittinghoff E, & Haas JS (2001). Factors associated with the health care utilization of homeless persons. JAMA, 285(2), 200–6. 10.1001/jama.285.2.200 (In Eng). [PubMed: 11176814]
21. Franco A, Meldrum J, & Ngaruiya C (2021). Identifying homeless population needs in the emergency department using community-based participatory research. BMC Health Services Research, 21(1), 428. 10.1186/s12913-021-06426-z [PubMed: 33952265]
22. Bharel M (2016). Emergency care for homeless patients: A window into the health needs of vulnerable populations. American Journal of Public Health, 106(5), 784–785. 10.2105/AJPH.2016.303161 (In Eng). [PubMed: 27049413]
23. Song JT, Tesselaar H, Stark M, Duvall MK, Gao D, & Fleming D (1999). HIV risk behaviors among homeless injection drug users of different ethnicities. AIDS and Behavior, 3(3), 187–194. 10.1023/A:1025448326028
24. Caccamo A, Kachur R, & Williams SP (2017). Narrative review: Sexually transmitted diseases and homeless youth—What do we know about sexually transmitted disease prevalence and risk? Sexually Transmitted Diseases, 44(8), 466–476. 10.1097/olq.0000000000000633 (In Eng). [PubMed: 28703725]
25. National Health Care for the Homeless Council. (2019). Homeless and health: What's the connection? National Health Care for the Homeless Council. https://nhchc.org/wp-content/uploads/2019/08/homelessness-and-health.pdf
26. NCQA. (2018). HEDIS 2018: Chlamydia screening in women. National Committee for Quality Assurance. https://www.ncqa.org/hedis/measures/chlamydia-screening-in-women/. Accessed May 2020.
27. National Center for HIV/AIDS Viral Hepatitis STD and TB Prevention (U.S.), Division of STD Prevention, Centers for Disease Control and Prevention (U.S.). (2018). Sexually transmitted disease surveillance 2018. U.S. Department of Health and Human Services, Centers for Disease

Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Division of STD Prevention.

28. (HUD) Department of Housing and Urban Development. (2019). Continuum of care homeless assistance programs homeless populations and subpopulations. Department of Housing and Urban Development (HUD). https://www.hudexchange.info/programs/coc/coc-homeless-populations-and-subpopulations-reports/. Accessed May 2020.
29. Ho YA, Rahurkar S, Tao G, et al. (2021). Validation of International Classification of Diseases, tenth revision, clinical modification codes for identifying cases of chlamydia and gonorrhea. Sexually Transmitted Diseases, 48(5), 335–340. 10.1097/olq.0000000000001257 (In Eng). [PubMed: 32740450]
30. Guo Y, Chen Z, Xu K, et al. (2020). International Classification of Diseases, tenth revision, clinical modification social determinants of health codes are poorly used in electronic health records. Medicine (Baltimore), 99(52), e23818. 10.1097/md.0000000000023818 (In Eng). [PubMed: 33350768]
31. Truong HP, Luke AA, Hammond G, Wadhera RK, Reidhead M, & Joynt Maddox KE (2020). Utilization of social determinants of health ICD-10 Z-codes among hospitalized patients in the United States, 2016–2017. Medical Care, 58(12), 1037–1043. 10.1097/mlr.0000000000001418 (In Eng). [PubMed: 32925453]
32. Bensken WP, Alberti PM, Stange KC, Sajatovic M, & Koroukian SM (2022). ICD-10 Z-code health-related social needs and increased healthcare utilization. American Journal of Preventive Medicine, 62(4), e232–e241. 10.1016/j.amepre.2021.10.004 (In Eng). [PubMed: 34865935]
33. Weeks WB, Cao SY, Lester CM, Weinstein JN, & Morden NE (2020). Use of Z-codes to record social determinants of health among fee-for-service Medicare beneficiaries in 2017. Journal of General Internal Medicine, 35(3), 952–955. 10.1007/s11606-019-05199-w (In Eng). [PubMed: 31325129]

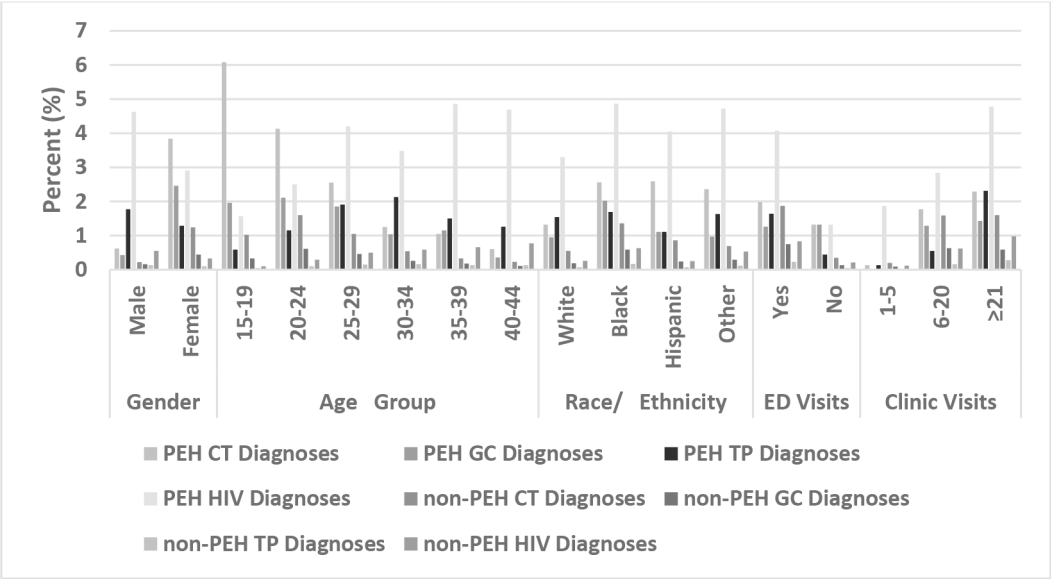

Fig. 1.

STI diagnoses among non-PEH vs PEH by demographic variables and other characteristics, MarketScan Medicaid Claims data 2019. *Note* "non-PEH" individuals are all other enrollees that were not coded (Z59.0) for PEH. *CT Chlamydia trachomatis; GC Neisseria gonorrhoeae; TP Treponema pallidum* (Syphilis), *HIV* human immunodefciency virus, *STI* sexually transmitted infection

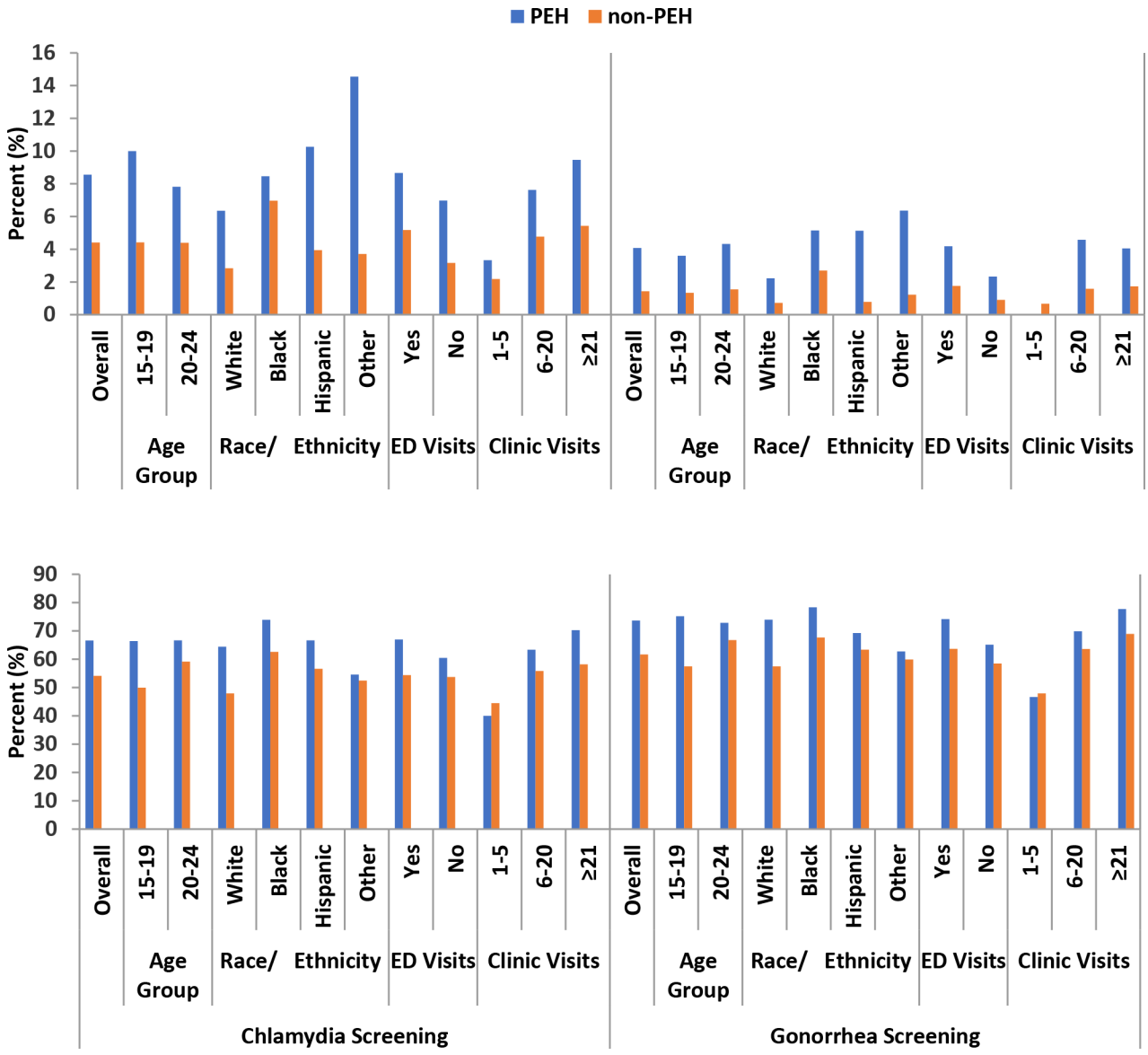

Fig. 2.

CT/GC screening and diagnoses of sexually active women aged 15–24 years by demographic and other characteristics, MarketScan Medicaid Claims data 2019. *Note* "non-PEH" individuals are all other enrollees that were not coded (Z59.0) for PEH. *CT Chlamydia trachomatis*; *GC Neisseria gonorrhoeae*; *TP Treponema pallidum* (Syphilis), *HIV* human immunodeficiency virus, *STI* sexually transmitted infection

Table 1

ED and outpatient clinical visits and other demographic characteristics of Homeless and non-PEH population aged 15–44, MarketScan Medicaid Claims data 2019

	Total	%	PEH		Non-PEH	
			Total	%	Total	%
Total	3,448,332	100.00	8706	0.25	3,439,626	99.75
Gender						
Male	1,312,294	38.06	5135	58.98	1,307,159	38.00
Female	2,136,038	61.94	3571	41.02	2,132,467	62.00
Age group						
15–19	1,037,226	30.08	510	5.86	1,036,716	30.14
20–24	502,795	14.58	1042	11.97	501,753	14.59
25–29	508,517	14.75	1571	18.05	506,946	14.74
30–34	545,059	15.81	1925	22.11	543,134	15.79
35–39	476,084	13.81	1996	22.93	474,088	13.78
40–44	476,084	10.98	1662	19.09	376,989	10.96
Race/Ethnicity						
White	1,627,361	47.19	4087	46.94	1,623,274	47.19
Black/African-American	1,119,645	32.47	2424	27.84	1,117,221	32.48
Hispanic	278,692	8.08	541	6.21	278,151	8.09
Other	422,634	12.26	1654	19.00	420,980	12.24
ER visits						
Yes	1,144,766	33.20	8253	94.80	1,136,513	33.04
No	2,303,566	66.80	453	5.20	2,303,113	66.96
Outpatient clinic visits						
1–5	1,828,791	53.03	750	8.61	1,828,041	53.15
6–20	1,058,491	30.70	2707	31.09	1,055,784	30.69
≥ 21	561,050	16.27	5249	60.29	555,801	16.16

“non-PEH” individuals are all other enrollees that were not coded (Z59.0) for homelessness *ED visit* emergency department visit

Table 2

Chlamydia and gonorrhea screening among 15–44 years old non-PEH vs PEH by demographic variables and other characteristics, MarketScan Medicaid Claims data 2019

Screening	PEH						non-PEH					
	Total	%	CT	% (CI%)	GC	% (CI%)	Total	%	CT	% (CI%)	GC	% (CI%)
Total	8706	100	2592	29.77 (28.81–30.75)	3312	38.04 (37.02–39.07)	3,439,626	100	549,285	15.97 (15.93–16.01)	695,731	20.23 (20.18–20.27)
Gender												
Male	5135	58.98	899	17.51 (16.48–18.57)	1259	24.52 (23.35–25.72)	1,307,159	38.00	74,274	5.68 (5.64–5.72)	111,380	8.52 (8.47–8.57)
Female	3571	41.02	1693	47.41 (45.76–49.06)	2053	57.49 (55.85–59.12)	2,132,467	62.00	475,011	22.28 (22.22–22.33)	584,351	27.40 (27.34–27.46)
Age group												
15–19	510	5.86	231	45.29 (40.91–49.73)	268	52.55 (48.11–56.96)	1,036,716	30.14	137,834	13.30(13.23–13.36)	186,112	17.95 (17.88–18.03)
20–24	1042	11.97	430	41.27 (38.26–44.33)	496	47.6 (44.53–50.68)	501,753	14.59	109,485	21.82(21.71–21.94)	127,481	25.41 (25.29–25.53)
25–29	1571	18.05	527	33.55 (31.21–35.94)	642	40.87 (38.42–3.34)	506,946	14.74	116,588	23.00 (22.88–23.11)	139,484	27.51 (27.39–27.64)
30–34	1925	22.11	568	29.51 (27.48–31.60)	730	37.92 (35.75–40.13)	543,134	15.79	90,939	16.74 (16.64–16.84)	113,378	20.87 (20.77–20.98)
35–39	1996	22.93	495	24.80 (22.92–26.76)	674	33.77 (31.69–35.89)	474,088	13.78	60,015	12.66 (12.56–12.75)	79,304	16.73 (16.62–16.83)
40–44	1662	19.09	341	20.52 (18.60–22.54)	502	30.2 (28.00–32.48)	376,989	10.96	34,424	9.13 (9.04–9.22)	49,972	13.26 (13.15–13.36)
Race/Ethnicity												
White	4087	46.94	1091	26.69 (25.34–28.08)	1507	36.87 (35.39–38.37)	1,623,274	47.19	209,791	12.92 (12.87–12.98)	294,344	18.13 (18.07–18.19)
Black/African-American	2424	27.84	916	37.79 (35.85–39.75)	1061	43.77 (41.78–45.77)	1,117,221	32.48	228,587	20.46 (20.39–20.54)	261,335	23.39 (23.31–23.47)
Hispanic	541	6.21	160	29.57 (25.76–33.62)	199	36.78 (32.71–41.00)	278,151	8.09	46,351	16.66 (16.53–16.80)	57,800	20.78 (20.63–20.93)
Other	1654	19.00	425	25.70 (23.60–27.87)	545	32.95 (30.69–35.27)	420,980	12.24	64,556	15.33 (15.23–15.44)	82,252	19.54 (19.42–19.66)

"non-PEH" individuals are all other enrollees that were not coded (Z59.0) for PEH

CT Chlamydia trachomatis; *GC Neisseria gonorrhoeae*; *TP Treponema pallidum* (Syphilis), *HIV* Human immunodeficiency virus, *STI* sexually transmitted infection

Table 3

Syphilis and HIV screening among 15–44 years old non-PEH vs PEH by demographic variables and other characteristics, MarketScan Medicaid Claims data 2019

Screening	PEH						non-PEH					
	Total	%	CT	% (CI%)	GC	% (CI%)	Total	%	CT	% (CI%)	GC	% (CI%)
Total	8706	100	2072	23.80(22.91–24.71)	2550	29.29 (28.34–30.26)	3,439,626	100	295,203	8.58 (8.55–8.61)	307,732	8.95 (8.92–8.98)
Gender												
Male	5135	58.98	929	18.09(17.05–19.17)	1283	24.99 (23.81–26.19)	1,307,159	38.00	39,491	3.02 (2.99–3.05)	55,743	4.26 (4.23–4.30)
Female	3571	41.02	1143	32.01 (30.48–33.57)	1267	35.48 (33.91–37.07)	2,132,467	62.00	255,712	11.99(11.95–12.04)	251,989	11.82(11.77–11.86)
Age group												
15–19	510	5.86	151	29.61 (25.68–33.78)	154	30.2 (26.24–34.39)	1,036,716	30.14	50,236	4.85 (4.80–4.89)	57,575	5.55 (5.51–5.60)
20–24	1042	11.97	303	29.08 (26.34–31.94)	327	31.38 (28.57–34.30)	501,753	14.59	63,840	12.72 (12.63–12.82)	58,948	11.75 (11.66–11.84)
25–29	1571	18.05	424	26.99 (24.81–29.26)	490	31.19 (28.90–33.55)	506,946	14.74	72,253	14.25 (14.16–14.35)	68,884	13.59 (13.49–13.68)
30–34	1925	22.11	487	25.3 (23.37–27.30)	619	32.16(30.07–34.29)	543,134	15.79	55,721	10.26 (10.18–10.34)	57,902	10.66 (10.58–10.74)
35–39	1996	22.93	422	21.14(19.37–23.00)	559	28.01 (26.04–30.03)	474,088	13.78	34,419	7.26 (7.19–7.33)	39,622	8.36 (8.28–8.44)
40–44	1662	19.09	285	17.15 (15.37–19.05)	404	24.13 (22.09–26.26)	376,989	10.96	18,734	4.97 (4.90–5.04)	24,801	6.58 (6.50–6.66)
Race/Ethnicity												
White	4087	46.94	949	23.22 (21.93–24.55)	1180	28.87 (27.49–30.29)	1,623,274	47.19	116,447	7.17 (7.13–7.21)	116,818	7.20(7.16–7.24)
Black/African-American	2424	27.84	677	27.93 (26.15–29.76)	768	31.68 (29.83–33.58)	1,117,221	32.48	123,486	11.05 (10.99–11.11)	132,043	11.82 (11.76–11.88)
Hispanic	541	6.21	104	19.22(15.99–22.80)	144	26.62 (22.94–30.56)	278,151	8.09	21,870	7.86 (7.76–7.96)	23,073	8.30 (8.19–8.40)
Other	1654	19.00	342	20.68 (18.75–22.71)	458	27.69 (25.54–29.92)	420,980	12.24	33,400	7.93 (7.85–8.02)	35,798	8.50 (8.42–8.59)

"non-PEH" individuals are all other enrollees that were not coded (Z59.0) for PEH

CT Chlamydia trachomatis; *GC Neisseria gonorrhoeae*; *TP Treponema pallidum* (Syphilis), *HIV* human immunodeficiency virus, *STI* sexually transmitted infection