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Chisom Okereke Date

T Cells and Jail Cells: A Comparative Analysis of Demographic and Behavioral Factors by HIV Status within the DC Jail

By

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Master of Public Health

Global Epidemiology

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By

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B.A., Public Health Studies
Johns Hopkins University
2019

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Abstract

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By Chisom Okereke

Introduction: Despite decreasing rates of HIV diagnoses in recent years, intersecting racial disparities in incarceration rates and HIV disease burdens have culminated in disproportionately high HIV prevalence within correctional facilities. This study seeks to determine if there are any significant demographic and behavioral differences between persons living with HIV (PLWH) and high-risk negative persons (HRNPs) within the District of Columbia's Department of Corrections' (DCDC) Jail.

Methods: Using responses from a 30–60-minute audio computer-assisted self-interviewing (ACASI) data collection system, we conducted univariate logistic regression analyses to obtain odds ratios of predictors for the outcome of HIV status. A secondary logistic regression analysis was conducted looking at the same outcomes adjusted for age.

Results: Of the total cohort, 72 individuals (75%) identified as HRNP while 24 individuals (25%) identified as PLWH. The unadjusted univariate logistic regression revealed that predictors such as prior syphilis diagnosis, having a main partner that is living with HIV, engaging in condomless anal intercourse (CAI), and marijuana use were significantly related to HIV status. However, after controlling for age, the number of significant predictors decreased. The adjusted odds ratios showed that the only predictors that are associated with HIV status are the HIV status of a main partner and marijuana use. The odds of being a PLWH was 3.59 (1.33 , 9.69; p=0.012) times higher than the odds of being a HRNP given that one's main-partner was also living with HIV. Furthermore, the odds of being a PLWH was 0.23 (0.05 , 0.95; p=0.043) times the odds of being a HRNP given that one used marijuana.

Discussion: There are demographic and behavioral factors that may predict one's HIV status in a US correctional setting. However, the differences that arise in the present day are less pervasive and widespread than what was seen at the beginning of the HIV epidemic, especially between HRNP and PLWH. This suggests a surprisingly narrow divide between these two groups. Continued investment in prevention measures such as PrEP for HRNP must be prioritized, especially in a carceral setting which may serve as an ideal linkage to care for some populations.

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Table of Contents

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Literature Review

Incarceration in the United States

The incarceration rate in the United States (US) dwarfs those found in other countries by a considerable margin. As of 2018, the US was incarcerating 655 persons out of every 100,000[14]. Globally, this value was closer to 150 persons per 100,000 -- less than 1/4 of the rate seen in the US [14]. Of the approximately 11 million people who are incarcerated globally, more than 2.2 million (20%) are here in the US [14]. Yet, the US only accounts for 4.25% of the global population[10]. Recently, *Mass Incarceration* has emerged as the designated term to describe the magnitude of this incarceration swell but it lacks insight into the observed demographic composition. Of the over 2 million individuals currently incarcerated in correctional facilities across the United States, Black and Hispanic communities jointly comprise nearly 56% of the incarcerated population, even though these groups make up only 30% of the general population [6].

The "tough on crime" era of American politics is often to blame for the surge in the otherwise stable incarceration rates observed from the 1920s to the 1970s [5]. These policies introduced mandatory minimums, longer prison sentences, and zero-tolerance drug laws [5]. Unsurprisingly, these laws disproportionately penalized Black and Hispanic communities [6]. As a result, the past four decades have brought with them a 500% increase in the number of incarcerated individuals accompanied by ongoing racial and ethnic disparities [6]. Although the laws enacted in the 1980's, such as differing punishment for various forms of cocaine, provide a definitive example of racialized laws impacting incarceration disparities, it is merely a symptom of the overall discriminatory nature of the criminal justice system [12]. Racial discrimination manifests as early as the initial arrest and continues to linger throughout the duration of one's judicial process [12]. Therefore, non-white persons were more likely to be arrested and actually serve prison time than their white counterparts [12]. Consequently, it is important, when

considering the high rates of incarceration in the US, to also consider the ever-present racial and ethnic inequities at play as well.

HIV Disease Burden in the United States

Currently, Human Immunodeficiency Virus (HIV) has a ~0.4% prevalence in the US [4]. The treatment and prevention landscape for HIV has produced marked declines in HIV-related morbidity in the US. Pharmaceutical advancements over the past four decades are largely to thank for a 48% decrease in incidence and a 69% decrease in mortality [7]. Although there were 34,800 incident cases of HIV in 2019, this is still only a third of the incidence recorded in the mid-1980s when transmission was at its height [4]. The advent of antiretroviral therapy (ART) has thoroughly revolutionized the medical methodologies used to treat the virus and, thus, the implications of a positive diagnosis [3]. Disease prognosis following HIV infection evolved from a countdown to certain death into the management of a chronic condition not unlike diabetes or arthritis. In fact, the prevalence of HIV in the US has seen a steady increase from 1,085,100 in 2014 to 1,189,700 in 2019 [4]. Although this may seem counterproductive to the efforts made to mitigate HIV disease burden, the implications of this increase are positive. This prevalence increase is indicative of life-expectancy increases for PLWH thanks to improved treatment protocols. Such strides have significantly bridged the gap between the life expectancy of PLWH and that of the general US population [8].

And yet, even with this promising landscape, the same racial and ethnic disparities seen in the criminal justice system have materialized regarding HIV. Black and Hispanic men who have sex with men (MSM) jointly comprised 56% of new HIV diagnoses among men in 2017; these groups only make up 1% of the general population [7]. This is despite research suggesting that black MSM engage in less risky behaviors associated with HIV than other MSM race

categories [15]. This same racial and ethnic imbalance is seen among women. Over the course of a lifetime, the risk of HIV diagnosis as a Black woman or Hispanic woman is 17 times and 4 times higher, respectively, than their white counterparts [7].

HIV Disease Burden in Correctional Settings

It is evident that correctional facilities are not impervious to national-level racial disparities. In fact, they are often directly influenced by such inequities. With this insight, it becomes much easier to extrapolate why correctional facilities experience disproportionately high HIV infection rates when compared to the general population. Individuals that are currently, or have previously been, incarcerated have a rate of HIV infection that is 3-5 times larger than the rate of their nonincarcerated counterparts [25]. Considering that one in seven PLWH have some interaction with the criminal justice system annually, it is clear how specific behaviors, such as the sharing of needles, condomless anal intercourse, and unsafe tattooing practices that are commonplace in prisons and the community create ample opportunities for HIV to spread from one individual to the next [23]. It is important to note, however, that while individuals who practice such behaviors are represented in carceral settings, it is most likely that the specific instance that led to transmission may not have occurred while incarcerated.

HIV Treatment in Correctional Settings

While prevalence of HIV has shown to exhibit significant inequities for incarcerated persons, the level of antiretroviral therapy (ART) access and adherence has also been shown to be substandard. In accordance with the United Nations' Nelson Mandela Rules, ART treatment needs to be provided to incarcerated persons [24]. Therefore, one would expect that involvement with the penal system would present individuals with the much-needed opportunity to be screened and given adequate treatment, especially when access to such care would be limited

otherwise. In some places, this is an actuality. In fact, many of those who have been linked to ART while in prison have been able to retain viral suppression [2]. When sufficient effort by prison health systems to provide ART is partnered with incarcerated persons who are able to adhere to treatment, health outcomes have been shown to be comparable to community cohorts [13]. Such efforts have yielded a significant decrease in the percentage of deaths attributable to AIDS within prisons, going from 34.2% to 4.6% between 1995 and 2006 [13]. However, standardized care is the goal but not yet the norm. Current data has indicated widespread inadequacies in ART uptake and adherence within correctional settings suggesting that there must be other factors at play that are compromising treatment efforts [9]. In fact, a Texas-based study in the not-too-distant past discovered that one in three incarcerated individuals that met the criteria for ART initiation actually began treatment [13].

Adherence presents a separate but related set of obstacles. It goes without saying that adhering to ART, although crucial for treatment success, is difficult to do without the proper resources, support systems, and internal motivation to do so. Studies have shown that nonadherence was often associated with deficiencies in all 3 aforementioned categories [9]. In addition to these barriers, one must not forget that correctional facilities are influenced by the same societal expectations and stigmas that permeate the general population. As a result, many persons living with HIV (PLWH) would much rather disregard treatment in spite of their diagnosis in order to maintain the image of not living with virus [9]. The negative perception of HIV infection and ART treatment, as a direct consequence of pervasive societal judgment, pushes those in need of treatment to forgo their best interests for their health in favor of their best interests socially [9]. This analysis highlights that one's health does not simply exist in a vacuum

and is at the whim of numerous external components; external components that are often exacerbated in correctional facilities.

When it comes to preventive medicine, HRNP in a correctional setting also have the opportunity to receive treatment. With the introduction of Pre-exposure Prophylaxis (PrEP), a form of ART used among persons not living with HIV to prevent disease acquisition, and Post-Exposure Prophylaxis (PEP) in the form of doxycycline to prevent bacterial infections shortly after a potential exposure, many are offered the opportunity to play a proactive role in their sexual health[17–19]. PrEP has been praised as an HIV prevention measure due to its ability to specifically target and impact high risk yet traditionally overlooked populations, especially incarcerated persons. Given PrEP's proven effectiveness against acquiring HIV following an exposure, whether exposed through sexual intercourse or injection drug use, it is not surprising that studies have indicated significant interest in the medication among criminal justice-involved persons. However, PrEP uptake in carceral settings, too, remains low despite participant intrigue and the ease at which one can be linked to such care when incarcerated [22]. Literature suggests that although an incarcerated individual may express interest in PrEP, barriers like those seen regarding ART uptake begin to materialize [20]. Stigma, mistrust of medical and penal systems, as well as low perceived risk for HIV acquisition serve as major hindrances for PrEP uptake in correctional facilities [22]. Furthermore, although there is significant interest for PrEP within this population, this intrigue is only present among those who are even aware of PrEP as a treatment option. Studies have shown that anywhere from 3-12% of criminal justice-involved persons know what PrEP is [22]. It is evident that there are gaps in HIV prevention knowledge that also impede HRNP's ability to advocate for their health, especially in a carceral setting.

Health Outcomes for PLWH vs. High-Risk Negatives

As mentioned earlier, strides in HIV treatment options have steadily bridged the divide in health disparities between PLWH and High-Risk Negative Persons (HRNPs). However, within the current HIV treatment landscape, differences between the two cohorts, if present, have not yet been fully understood. Namely, uncertainties persist regarding factors associated with increased life expectancy for PLWH other than ART. As mentioned earlier, the use of life expectancy as a comparative metric indicates that recent advancements in HIV treatment have significantly bridged the gap between the two groups. So much so, that a 20-year-old PLWH given ART could expect to live nearly as long as a 20-year-old who is not living with HIV [8]. Despite this, the ever-present gap persists and the life expectancy of PLWH still consistently lags behind their negative counterparts [8]. Recent studies have attempted to better understand this dynamic; they suggest that, when compared with the general population, demographic, clinical, and behavioral factors often seen among PLWH are associated with increases in morbidity [8]. As a result, certain lifestyle factors apart from one's HIV status, are responsible for this persistent gap in life expectancies [8]. The results of this analysis indicate although ART has served as the great equalizer between these two cohorts, there may exist behavioral differences that slightly separate these groups. While investigations have been made at a population-level to understand these similarities and differences, literature is sparse regarding these two groups in a correctional setting.

Introduction

The objective of the present study is to explore the differences between PLWH and HRNPs who were held within the DC Jail from November 2020 to August 2021. Considering the ubiquitous nature of routine HIV screening protocols, adequate linkage to care, and accessibility of HIV treatment within Washington DC, we expected few individuals with new diagnoses within the facility. However, given the pervasive disparities present in incarceration rates and HIV disease burden, we hypothesized that there may be demographic differences between the groups.

Given that the groups are found to be similar, inquiries into widespread PrEP uptake initiatives among incarcerated HRNP would be necessary to prevent HIV acquisition. The provision of these services within a carceral setting is crucial, especially since incarceration serves as meaningful linkage to care for criminal justice-involved persons.

Methods

Overview: Study Design and Population

This is a secondary analysis of a cross-sectional study wherein responses from a survey administered during intake at the DC Jail and upon referral from infectious disease/chronic care healthcare providers were analyzed. The questions for the survey were influenced, in part, by similar surveys given by the National Institute on Drug Abuse (NIDA) including the Seek, Test, Treat, and Retain model of care (STTR-CJ) in the Criminal Justice System, and the Addiction Severity Index (ASI). The survey was administered from November 2020 to August 2021.

The DC Jail is a metropolitan facility located in Southeast Washington DC that houses both men and women as they await trial or sentencing for felony and misdemeanor charges. This

facility also houses incarcerated persons who are serving sentences of up to, but no more than, a year. Within the DC Jail, the average daily population was 1034 in 2020 and 1059 in 2021; women routinely make up less than 10% of the population [16]. Due to the dynamic nature of prison populations, it is important to consider intakes and releases on an annual basis as well. By fiscal year, the DC jail saw 6,149 intakes and 6,557 releases in 2020 and 3,271 intakes and 3,119 releases in 2021 as seen in Figure 2 [16]. Among this population, men, women, and transgender individuals were recruited for this analysis (n=110), although the total number of women (n=6) and transgender (n=4) participants was small compared to men. The regression models were run excluding all participants who declined to provide information regarding HIV status and gender in the survey. As a result, the total cohort (n=96) for this analysis consisted of 89 men, 3 women, and 4 transgender participants.

Data Collection

The survey used for data collection was a 30–60-minute audio computer-assisted self-interviewing (ACASI) survey that was administered at intake or during healthcare facilitated recruitment which took place 3 to 4 times a week from November 2020 to August 2021 according to the schematic in Figure 1. Participants were selected according to two different factors; 1) having a positive HIV status, or 2) possessing risk factors that are known to be associated with HIV acquisition. These risk factors were identified in accordance with the CDC questionnaire regarding indicators for PrEP. All HRNPs who were recruited for this study were provided with PrEP-related information. Informed consent was obtained from all participants. Although recruitment took place from late 2020 to mid 2021, participants were considered ineligible if they entered the DC jail prior to 2019.

Data Analysis

All statistical analysis was conducted using R. The primary outcome of interest in this study was HIV Status; specifically if one was a PLWH or a HRNP. To quantify the association between various demographic/behavioral exposures and HIV Status outcomes, univariate logistic regressions were used to calculate an odds ratio (OR). A significance value of $p<0.05$ was used to identify significant relationships between outcome and exposure. For conciseness, certain variables were collapsed to avoid repetitive categorizations (i.e., '3 to 4 times a day' and '10+ times a day' were collapsed into 'Daily'). During the logistic regression analysis, the substance use variables were further collapsed into dichotomous categories to allow for two comparison groups. For instance, 'daily', 'weekly', and 'monthly' responses were all categorized under 'Yes' meaning that the respondent had used the substance. We also ran a secondary analysis using logistic regression adjusting for age as a potential confounder. A generalized linear model was used to account for distribution irregularities in the variables of interest.

Results

Overall Descriptive Statistics of Incarcerated Cohort

As shown in Table 1, of the 110 participants analyzed in this study, 81 individuals (73.6%) identified as HRNPs while 29 individuals (26.4%) identified as PLWH. Several demographic characteristics were also reported in this table. The average age for the entire cohort was 36.5 (11.4) years old, however, a 9-year gap in average age between the groups suggests that HRNPs (34.2) tended to be younger than PLWH (43.0). Most of the cohort identified as non-Hispanic (92.6%) and Black (82.6%). Of the total cohort, men comprised 90.8% (n=99) while women and transgender individuals comprised 5.5% (n=6) and 3.7% (n=4) of the cohort, respectively.

Behavioral characteristics regarding sexual habits and substance use were reported in Table 1. Sexually transmitted infection (STI) testing history was among the survey questions asked. Of the total cohort, 29.3% had previously tested positive for gonorrhea while 34.3% had previously tested positive for chlamydia. However, only 8.3% had ever tested positive for syphilis. Among participants that knew the status of their main sexual partner, 70.3% had indicated that their partner was not living with HIV. For those that indicated not having a main sexual partner, the average number of non-main partners was 3.24 (4.06). Most participants reported engaging in Condomless Anal Intercourse (CAI) as only 26.7% (n=27) reported using condoms during their last anal sexual encounter. Regarding substance use, participants were surveyed on alcohol consumption, as well as marijuana, stimulant, and injection drug use. Within this sample population, 52.3% (n=57) indicated alcohol consumption in the 12 months prior to survey administration. Among the 57 participants, 24 individuals reported that they never drank more than 5 drinks in one sitting. However, 15 individuals responded that they may have more than 5 drinks in one sitting on, at least, a monthly basis. Of the illicit drugs surveyed, marijuana had the highest frequency of use; 22.7% (n = 25) of participants use marijuana daily. In fact, it was the only illicit drug that indicated more users than abstainers (12.7%; n=14). Comparatively, 3.6% (n=4) of participants used stimulants on a daily basis, 3.6% (n=4) used injection cocaine, and 6.4% (n=7) used injection heroin. For these illicit drugs, most participants reported that they never used these substances (50% for stimulants, 50% for injection cocaine, and 47.3% for injection heroin). It is important to note that nearly half of substance use data was consistently recorded as missing.

Univariate Comparative Analysis by HIV Status

The univariate logistic regression used in this analysis uncovered a few significant relationships between HIV Status and demographic/behavioral characteristics, as shown in Table 2. The 9-year gap in average age between HRNPs and PLWH was shown to be significant. Results revealed that for a one-year increase in age, the odds of identifying as a PLWH increased by factor 1.07 [1.02 , 1.11] with a p-value of 0.003. Furthermore, several sexual behavior and substance use factors exhibited significant relationships with HIV status. Among sexual behaviors, having a prior syphilis diagnosis was shown to increase the odds of being a PLWH by a factor of 10.8 [2.19 , 86.9; p=0.003]. In addition, having a main-partner who was HIV-positive increased the odds of being a PLWH by 3.81 times [1.32 , 11.2; p=0.019]. Finally, engaging in CAI during their last sexual encounter increased the odds of identifying as a PLWH by 2.94 times [1.07 , 8.14; p=0.037]. Regarding substance use, only marijuana use was shown to have a significant relationship with HIV Status. The odds of being a PLWH actually decreased by a factor of 0.19 [0.04 , 0.79; p=0.020] given that the participant used marijuana.

Ethnicity, race, and gender were among the demographic characteristics that did not show a significant relationship with HIV status. Among the sexual behavior variables, prior gonorrhea and chlamydia diagnoses were not shown to have a significant association with HIV status. The same can be said for the number of non-main partners that one reported. Lastly, regarding substance use, although PLWH were consistently less likely to partake in drugs, the relationship was not shown to be significant with p-values all exceeding $\alpha < 0.05$.

Demographic and Behavioral Logistic Regression Analysis by HIV Status Controlled for Age

According to the prior analysis of HIV status and age, a significant relationship exists between these two variables. Further visualizations of the data, as shown in Figures 4-6, show

the significant differences in age distribution between the PLWH and HRNPs cohorts. These results suggested that PLWH tended to be older than their HRN counterparts. This prompted a deeper dive into age as a potential confounder for this analysis. Table 2 includes the adjusted ORs obtained from a logistic regression with age, as a continuous variable, serving as the confounder. An adjusted analysis of the demographic predictors such as race, ethnicity, and gender showed that the relationships that were insignificant in the unadjusted model remained so when controlling for age. In the unadjusted regression for prior STI diagnoses such as gonorrhea, chlamydia, and syphilis, two of the infections (gonorrhea and chlamydia) were shown to not have a significant association with HIV status. However, the results suggested that the odds of identifying as PLWH were 10.8 times higher given that one had a prior syphilis diagnosis (2.19 , 86.9; p = 0.003). When adjusted for age, this relationship was proven to be insignificant (2.49 [0.17 , 37.1]; p=0.508) suggesting that age was a confounder in this relationship. Furthermore, another sexual behavior, CAI during the last sexual encounter, that had a significant relationship with HIV status in the unadjusted model was shown to be insignificant once adjusted for age (2.56 [0.94 , 6.95]; p=0.065). HIV status of the main partner was the only sexual behavior that maintained a significant relationship with HIV status when adjusted for age (3.59 [1.33 , 9.69]; p=0.012). Regarding substance use differences between the two groups, a similar trend emerged. Prior to adjustment, marijuana use was significantly associated with HIV, as the odds of identifying as a PLWH were decreased given that one uses marijuana. When adjusting for age, the relationship remained significant, however to a smaller degree (0.23 [0.05 , 0.95]; p=0.043). The other substance use inquiries, all of which were insignificant prior to adjustment, remained so after controlling for age.

Discussion

Main Findings

When adjusting for the difference in age distribution between the two groups, HRNP and PLWH exhibit similar demographic and behavioral characteristics. Demographic characteristics such as ethnicity, race, and gender were not shown to be adequate predictors of HIV status within the DC Jail. Furthermore, sexual behaviors such as prior STI diagnosis (including gonorrhea, chlamydia, and syphilis), number of non-main partners, and CAI were also shown to be ineffective at predicting one's HIV status in this correctional setting. The status of one's main partner, on the other hand, did result in a significant association with HIV status; the odds of being a PLWH was increased by a factor of 3.59 (1.33 , 9.61; p=0.012) if one's main partner was also a PLWH. However, given that both cohorts reported engaging in CAI more often than not, this is not a surprising result. Regarding substance use, a very similar set of trends were revealed due to this analysis. Injection drug use (cocaine and heroin) and stimulant use were shown to have an insignificant relationship with HIV status. The only drug that indicated a significant association was marijuana, the use of which was shown to be protective against living with HIV. The overall results of this analysis suggest comparable lifestyles for both cohorts despite perceptions that these groups differ significantly simply due to their HIV status.

It is important to note, however, that the majority of the participants in this study were black men. Although Washington DC is a predominantly black city (45.39%), this population outnumbers the white population by a slim margin (~4%) [21]. Yet, they comprised nearly 80% of our study population. This is representative of the racial inequities that are still pervasive throughout the criminal justice system.

Limitations

There were several limitations to this analysis that must be acknowledged. The first limitation is regarding the survey used for data collection. As evidenced by Table 1, several questions regarding substance use were largely left unanswered by participants, with some "Missing" categories reaching over 50%. This was due, in large part, to the length of the survey, especially when it came to participants that were given the survey upon intake. Sixty percent of the participants in this study were enrolled during their intake process, therefore this had a considerable impact on their stamina for completing this survey. Intake at a correctional facility can occur at any time of day. During recruitment, intake tended to take place beginning at 5pm and continuing into the early hours of the morning. It seems that the length of the survey, combined with variable intake times, prevented many participants from being able to reach, and thus adequately answer, the substance use questions that were asked near the end of the 30–60-minute survey. This resulted in incomplete data. Furthermore, the number of incarcerated women and transgender participants were disproportionately low compared to incarcerated men in the study. This likely provides issues with generalizability when it comes to those populations.

Finally, the timing of the study presented its own set of limitations. Recruitment for the study from November 2020 to August 2021 also coincided with the height of the COVID-19 pandemic. The need for social distancing hindered the amount of outside study staff who were able to enter the facility to conduct recruitment, and thus, we were unable to enroll participants as often as desired. In addition to this, as seen in Figure 1, there was a marked decrease in incarceration within the DC Jail. This was, again, in an effort to mind social distancing guidelines and limit overcrowding within facilities. As a result, there was an overall lower population size to recruit from, which resulted in a smaller sample size and lower study power.

Public Health Implications

The results of this study reinforce the need for widespread PrEP uptake within carceral settings. Criminal justice involved-persons already carry a disproportionately large portion of the HIV disease burden within the US, a country with more than enough resources to provide to this population. As evidenced by this analysis, a reactive HIV test, to a large degree, is one of the only things separating HRNP and PLWH. Thus, to prevent HIV acquisition among HRNP, it is important to educate incarcerated populations about PrEP as a prevention option and provide adequate resources to support consistent uptake. In order to facilitate this process, however, much needs to be done within the penal system to rebuild trust among those that they are meant to rehabilitate. Public health, as a discipline, champions relationship building and collaboration within the communities it wishes to serve. The heavily racialized nature of the carceral system understandably contributes to the widespread mistrust felt among incarcerated populations. This mistrust requires significant equity-based reform within the system if it is to cultivate an environment conducive to successful PrEP interventions. Although this may seem daunting, these efforts can, and must be made, if such facilities are to truly be deemed "correctional" in nature.

Conclusion

This analysis served to further highlight the racial disparity that is existent within the penal system and the HIV epidemic. Furthermore, this analysis highlighted ways in which PLWH and HRNPs, two groups that may have been viewed in vastly different lights in the past, are actually quite similar. The use of PrEP as a prevention option must be advocated for, especially in carceral settings where access to care is most likely, among HRNP to prevent

acquisition. With continued improvements in HIV prevention and treatment, one can look forward to a future where these two groups are separated not by their lifestyle, health prognoses, or life expectancy, but by a single reactive result that no longer carries the same gravity as it once did.

Next Steps

This analysis further highlighted the need for PrEP provision within carceral settings, especially among HRNP. However, literature is sparse regarding current levels of PrEP uptake in correctional facilities as well as barriers to adherence. The implementation of effective HIV prevention initiatives is reliant upon proper insight into how such treatments would be perceived by incarcerated individuals in conjunction with the ability of the penal system to reliably provide them. There is also limited insight into the continuum of care within a jail or prison for those serving longer sentences *and* for those with shorter sentences that will need to be linked to service providers upon release. As a result, the next steps would require a study investigating the reality of providing PrEP for this population. Such a study would explore several different aspects in a two-pronged approach wherein 1) the population of interest, HRNP, is better understood so that their needs can be met and 2) the capacity of the carceral system is evaluated to ensure adequate provision. For the first HRNP-focused prong, knowledge among HRNP of PrEP as a treatment option, perceptions regarding their own risk level, sources of hesitance for PrEP uptake, and issues with adherence would be studied. Within the carceral system analysis, inquiries into financial considerations, healthcare personnel, and community networking for linkage to care port-release are crucial.

Tables and Figures

Table 1: Demographic and Behavioral Characteristics of Sample Population by HIV Status

	High Risk Negative Persons (N = 81)	**Persons Living with HIV (N = 29)**	**Total (N=110)**
Age Mean (SD) Median [Min, Max]	34.2 (10.6) 31.0 [18.0, 66.0]	43.0 (11.2) 40.0 [26.0, 66.0]	36.5 (11.4) 35.5 [18.0, 66.0]
Hispanic or Latinx No Yes	73 (90.1%) 7 (8.6%)	27 (93.1%) 1 (3.4%)	100 (92.6%) 8 (7.40%)
Race Black/African American Other	65 (80%) 16 (19.8%)	25 (86.2%) 3 (10.3%)	90 (82.6%) 19 (17.4%)
Gender Male Female Transgender	77 (95.1%) 2 (2.5%) 2 (2.5%)	22 (75.9%) 4 (13.8%) 2 (6.9%	99 (90.8%) 6 (5.5%) 4 (3.7%)
Previously Tested Positive for Gonorrhea No Yes	55 (74.3%) 19 (25.7%)	15 (60.0%) 10 (40.0%)	70 (70.7%) 29 (29.3%)
Previously Tested Positive for Chlamydia No Yes	50 (67.6%) 24 (32.4%)	15 (60.0%) 10 (40.0%)	65 (65.7%) 34 (34.3%)
Previously Tested Positive for Syphilis No Yes	71 (97.3%) 2 (2.7%)	18 (75.0%) 6 (25.0%)	89 (91.8%) 8 (8.2%)
HIV Status of Main Partner HIV-Negative HIV-Positive	59 (78.7%) 16 (21.3%)	12 (46.2%) 14 (53.8%)	71 (70.3%) 30 (29.7%)

Condom Use During Last Sexual Encounter No Yes	 59 (78.7%) 16 (21.3%)	 15 (57.7%) 11 (42.3%)	 74 (73.3%) 27 (26.7%)
Number of Non-Main Partners Mean (SD) Median [Min, Max]	 2.56 (2.46) 2.00 [1.00 , 14.0]	 5.40 (6.88) 3.00 [1.00 , 23.0]	 3.24 (4.06) 2.00 [1.00 , 23.0]
Alcohol Use in the Last 12 Months No Yes	 37 (45.7%) 44 (54.3%)	 15 (53.4%) 13 (46.4%)	 52 (47.7%) 57 (52.3%)
Frequency of More Than 5 Drinks in One Sitting Daily or almost daily Less than Monthly Monthly Never Weekly Missing	 3 (3.7%) 13 (16.0%) 6 (7.4%) 19 (23.5%) 3 (3.7%) 37 (45.7%)	 1 (3.4%) 3 (10.3%) 2 (6.9%) 5 (17.2%) 0 (0%) 18 (62.1%)	 4 (3.6%) 16 (14.5%) 8 (7.3%) 24 (21.8%) 3 (2.7%) 55 (50.0%)
Frequency of Marijuana Use 1-3 times a month Daily Never Only a few times Weekly Missing	 3 (3.7%) 23 (28.4%) 7 (8.6%) 7 (8.6%) 9 (11.1%) 32 (39.5%)	 1 (3.4%) 2 (6.9%) 7 (24.1%) 1 (3.4%) 2 (6.9%) 16 (55.2%)	 4 (3.6%) 25 (22.7%) 14 (12.7%) 8 (7.3%) 11 (10.0%) 48 (43.6%)
Frequency of Stimulant Use 1-3 times a month Daily Never Only a few times Weekly Missing	 1 (1.2%) 4 (4.9%) 43 (53.1%) 1 (1.2%) 0 (0%) 32 (39.5%)	 0 (0%) 0 (0%) 12 (41.4%) 0 (0%) 1 (3.4%) 16 (55.2%)	 1 (0.9%) 4 (3.6%) 55 (50.0%) 1 (0.9%) 1 (0.9%) 48 (43.6%)
Frequency of Injection Cocaine Use 1-3 times a month Daily Never Only a few times Weekly Missing	 1 (1.2%) 3 (3.7%) 43 (53.1%) 2 (2.5%) 0 (0%) 32 (39.5%)	 0 (0%) 1 (3.4%) 12 (41.4%) 0 (0%) 0 (0%) 16 (55.2%)	 1 (0.9%) 4 (3.6%) 55 (50.0%) 2 (1.8%) 0 (0%) 48 (43.6%)

Frequency of Injection Heroin Use			
1-3 times a month	0 (0%)	0 (0%)	0 (0%)
Daily	5 (6.2%)	2 (6.9%)	7 (6.4%)
Never	41 (50.6%)	11 (37.9%)	52 (47.3)
Only a few times	2 (2.5%)	0 (0%)	2 (1.8%)
Weekly	1 (1.2%)	0 (0%)	1 (0.9%)
Missing	32 (39.5%)	16 (55.2%)	48 (43.6%)

Figure 1. Flow chart of recruitment process for study participants

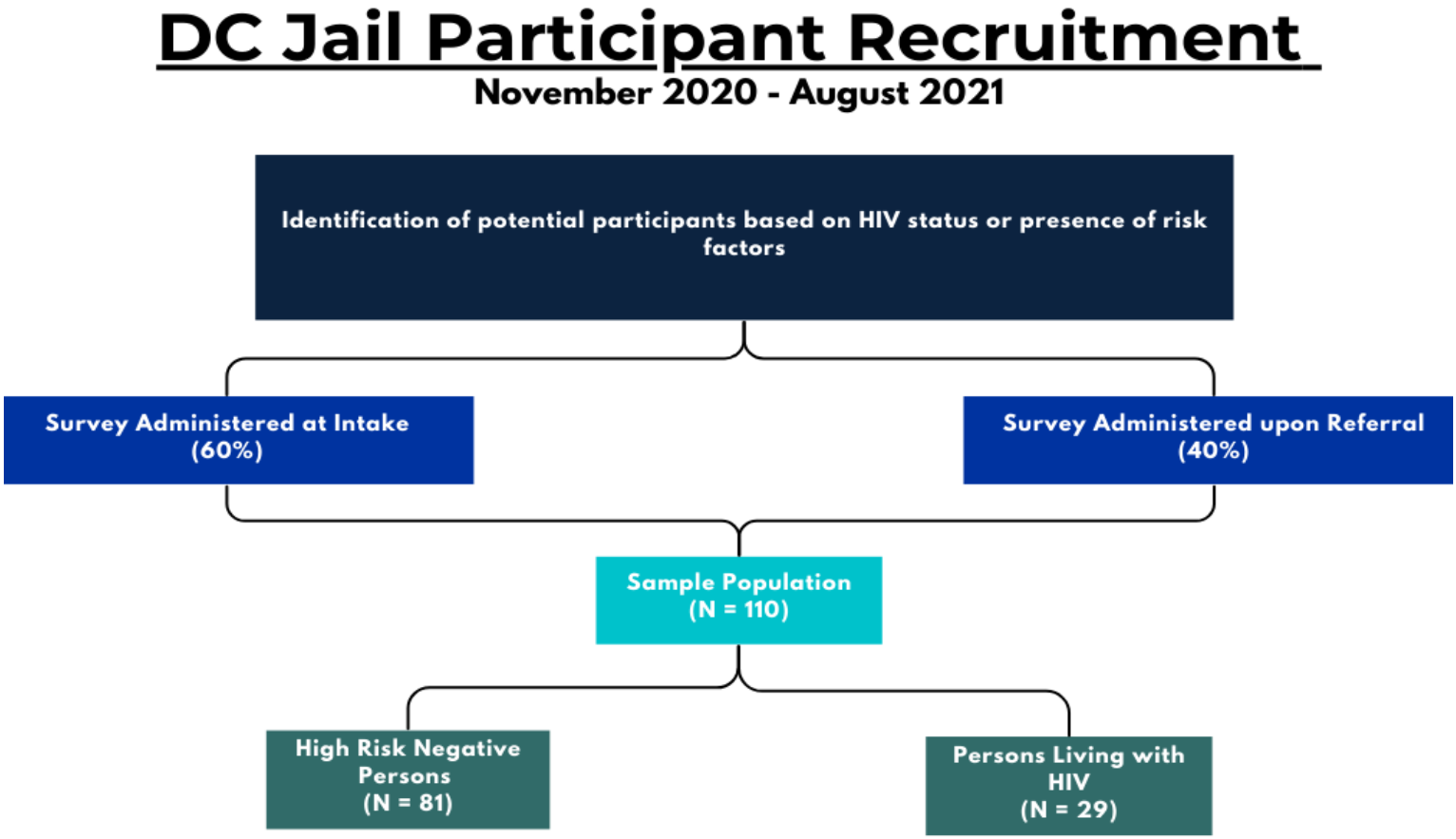


Figure 2. The number of intakes and releases by fiscal year provided by the DC Department of Corrections[16]

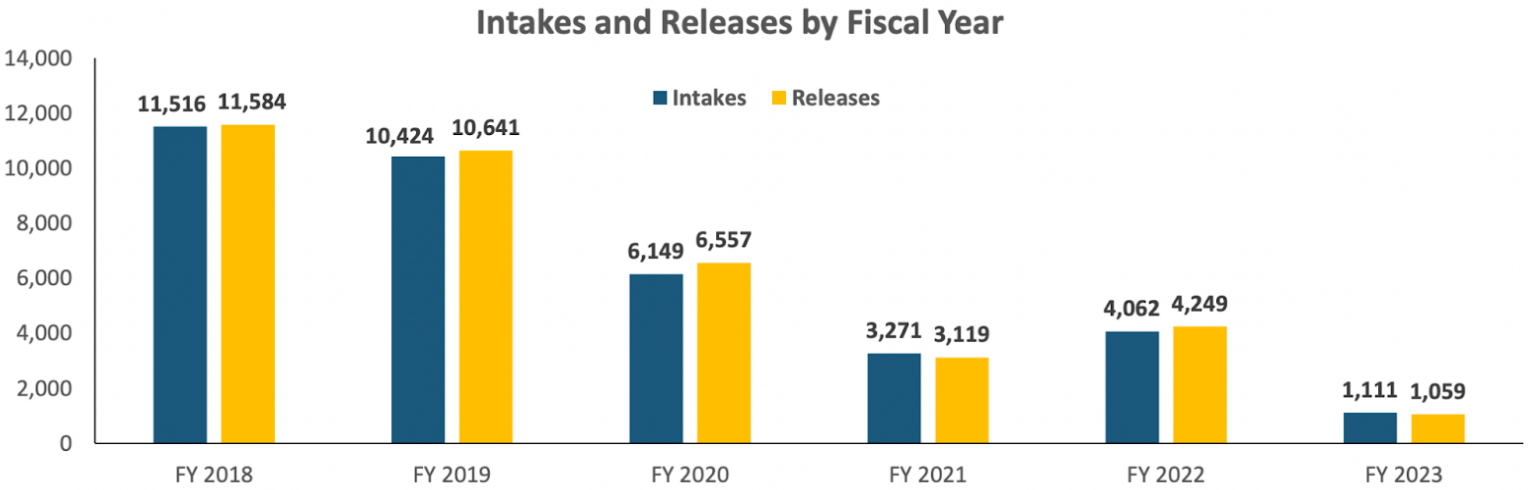
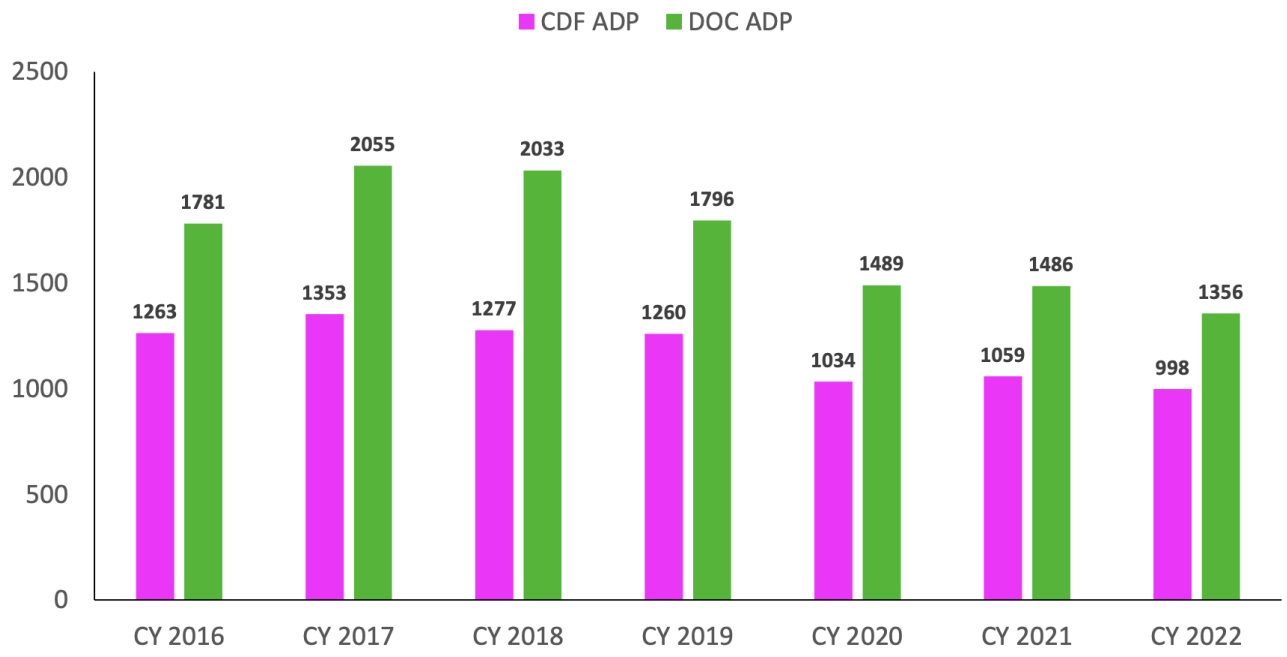


Figure 3. DC Department of Corrections Average Daily Population by Calendar Year for the Central Detention Facility (CDF) and DOC Total provided by the DC Department of Corrections[16]



The DC Department of Corrections includes inmate populations at the Central Detention Facility (CDF) and the Correctional Treatment Facility (CTF). The data depicted includes a daily average of thirty-one (31) inmates held for the US Marshall's Service of Greenbelt MD and zero (0) Short Term Sentenced Felons held for the Federal Bureau of Prisons.

Table 2. Results of univariate logistic regression analysis of the association between HIV Status (outcome) and demographic/behavioral characteristics (exposure) in survey population. An unadjusted OR and adjusted OR are shown. The Adjusted OR is controlling for age only. Statistically significant p-values (α < 0.05) are highlighted in yellow.

	High Risk Negative Persons (N = 72)	Persons Living with HIV (N = 24)	Unadjusted Odds Ratio [95% CI]	p-value	Adjusted Odds Ratio [95% CI]	p-value
Age	33.8 (10.7)	42.3 (11.4)	1.07 [1.02 , 1.11]	0.003	-	-
Hispanic or Latinx						
No	67 (93.1%)	23 (95.8%)	Ref.	1.00	Ref.	0.191
Yes	5 (6.9%)	1 (4.1%)	0.65 [0.02 , 4.51]		0.21 [0.02 , 2.18]	
Race						
Black/African American	58 (80.6%)	21 (87.5%)	Ref.	0.549	Ref.	0.351
Other	14 (19.4%)	3 (12.5%)	0.61 [0.13 , 2.16]		0.52 [0.13 , 2.05]	
Gender						
Male	69 (95.8%)	20 (83.3%)	Ref.		Ref.	
Female	1 (1.4%)	2 (8.3%)	6.90 [0.59 , 80.1]	0.123	8.01 [0.68 , 94.8]	0.099
Transgender	2 (2.8%)	2 (8.3%)	3.45 [0.46 , 26.1]	0.230	4.53 [0.57 , 35.9]	0.152
Previously Tested Positive for Gonorrhea						
No	53 (73.6%)	14 (58.3%)	Ref.	0.248	Ref.	0.451
Yes	19 (26.4%)	10 (41.7%)	1.98 [0.73 , 5.26]		3.19 [0.02 , 6.21]	
Previously Tested Positive for Chlamydia						
No	48 (66.7%)	18 (75.0%)	Ref.	0.611	Ref.	0.311
Yes	24 (33.3%)	6 (25.0%	0.68 [0.22 , 1.88]		2.16 [0.01 , 4.20]	
Previously Tested Positive for Syphilis						
No	70 (97.2%)	18 (75.0%)	Ref.	0.003	Ref.	0.508
Yes	2 (2.78%)	6 (25.0%)	10.8 [2.19 , 86.9]		2.49 [0.17 , 37.1]	
HIV Status of Main Partner						
HIV-Negative	56 (82.4%)	12 (54.5%)	Ref.	0.019	Ref.	0.012
HIV-Positive/Unknown	12 (17.6%)	10 (45.5%)	3.81 [1.32 , 11.2]		3.59 [1.33 , 9.69]	

Condom Use During Last Anal Sexual Encounter No Yes	53 (77.9%) 15 (22.1%)	12 (54.5%) 10 (45.5%)	Ref. 2.94 [1.07 , 8.14]	0.037	Ref. 2.56 [0.94 , 6.95]	0.065
Number of Non-Main Partners	2.56 (2.46)	5.40 (6.88)	1.17 [0.96 , 1.42]	0.231	1.12 [0.95 , 1.34]	0.176
Marijuana Use No Yes	7 (15.6%) 38 (84.4%)	6 (50.0%) 6 (50.0%)	Ref. 0.19 [0.04 , 0.79]	0.020	Ref. 0.23 [0.05 , 0.95]	0.043
Stimulant Use No Yes	39 (86.7%) 6 (13.3%)	11 (91.7%) 1 (8.33%)	Ref. 0.66 [0.02 , 4.64]	1.00	Ref. 0.56 [0.06 , 5.33]	0.611
Injection Cocaine Use No Yes	40 (88.9%) 5 (11.1%)	11 (91.7%) 1 (8.33%)	Ref. 0.88 [0.03 , 6.01]	1.00	Ref. 0.49 [0.04 , 5.57]	0.564
Injection Heroin Use No Yes	37 (82.2%) 8 (17.8%)	10 (83.3%) 2 (16.7%)	Ref. 0.97 [0.12 , 4.83]	1.00	Ref. 0.89 [0.15 , 5.30]	0.906

Figure 4. Distribution of age in years within the entire cohort.

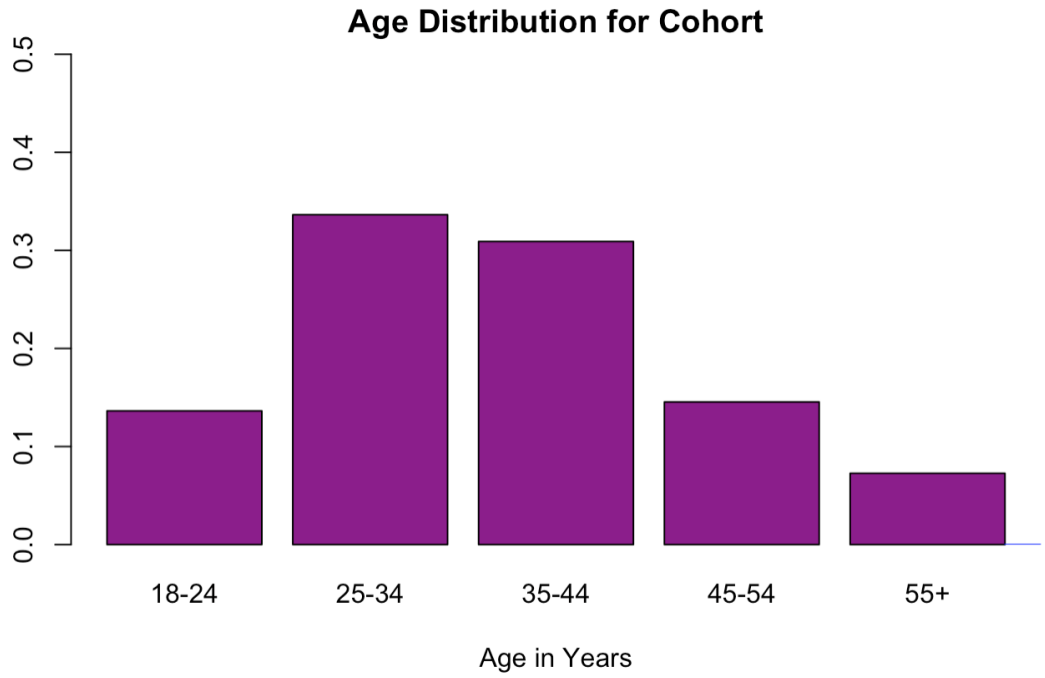


Figure 5. Distribution of age in years among PLWH.

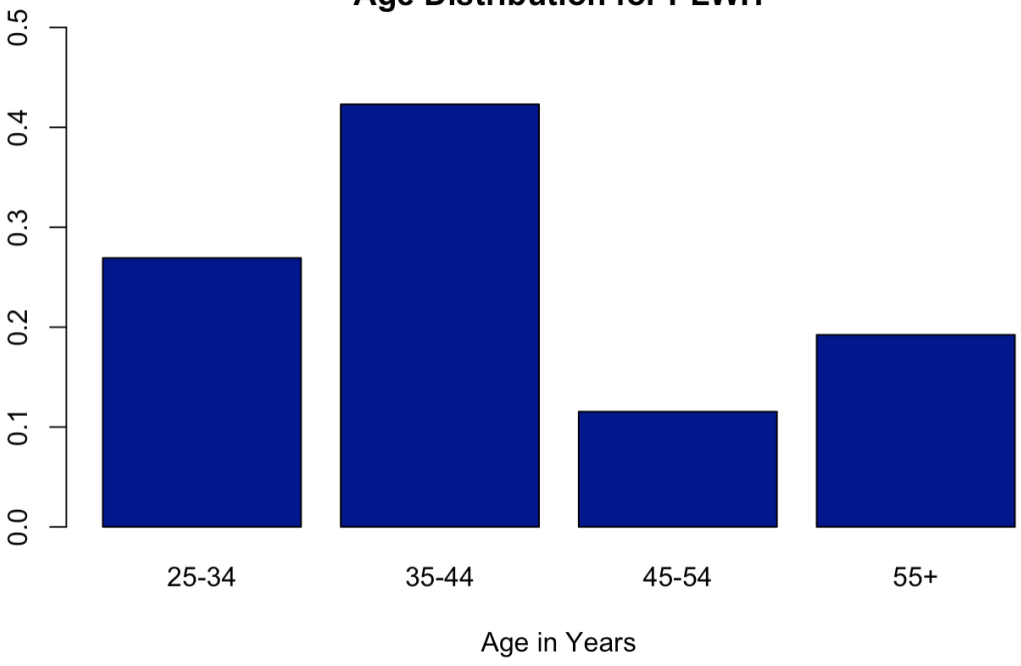
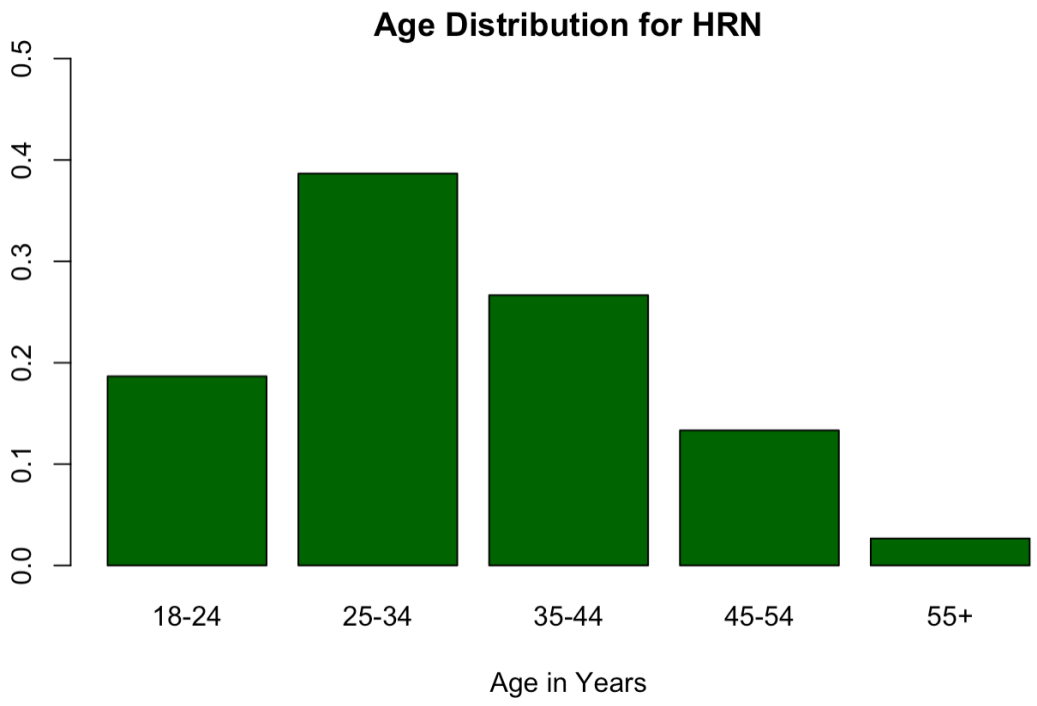


Figure 6. Distribution of age in years among HRNP.



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