Stop the Spread: Geographically Tracking the Syphilis Outbreak in Houston/Harris County, TX

Monica Branch
MD Candidate 2017
Chicago Medical School at Rosalind Franklin University of Medicine & Science
2014 GE-National Medical Fellowships Primary Care Leadership Program Scholar
Legacy Community Health Services, Houston, TX

Abstract

In 2012, the Houston Department of Health and Human Services (HDHHS) declared a syphilis outbreak in Houston/Harris County after observing a 97% increase in the number of primary and secondary syphilis infections compared to the same time period in 2011\textsuperscript{2,3}. The purpose of this project was to identify the prevalence of syphilis infections by zip code. Identifying these geographical areas will assist the S.E.A.C. and Legacy Community Health Services in deploying resources to these communities in efforts to provide education and screening to these high-risk populations. An inquiry of Legacy’s electronic medical records system (Centricity) was performed to identify the number of syphilis infections by zip code and by sex, race/ethnicity, and HIV co-infection in Houston/Harris County among all active patients at Legacy Community Health Services. A total of 1,282 syphilis cases were reported among active patients in Centricity. The majority (91%) was male; (88%) of those males were HIV+; and (41%) were Black. The overall prevalence of syphilis among the 97 zip codes in Houston/Harris County is 4.40%. The majority of the syphilis diagnoses (98 cases; 7.64%) were within the 77006 zip code among white males with a prevalence of 0.5%. However, other areas outside of this zip code reported syphilis cases where 67-97% were among Black males. It is recommended that Legacy continue to expand its syphilis prevention measures to target these high-risk communities.
Introduction

As I began my externship at Legacy Community Health Services in Houston, TX, I noticed right away that there were a lot of patients seeking treatment at Legacy for syphilis infections. I was then informed that Houston had realized a dramatic spike in the number of syphilis infections in the last two years – particularly among men who have sex with men (MSM). There was no clear answer regarding why there had been such a dramatic increase in the number of syphilis cases.

Many of the providers believed that syphilis was being spread throughout the gay community via the advent of smartphone apps like Grindr, Adam2Adam, and Bear. These smartphone apps are social/sexual media websites where gay men can meet for random sexual encounters. We were interested in identifying where these individuals were located geographically to see if there were any trends related to the prevalence of syphilis in Houston/Harris County. Identifying these geographical areas is a key step in ensuring that the Public Health department at Legacy continues targeting the right areas for screening and education, and also exploring new areas in efforts to provide screening and education to these high-risk populations.

Background

Syphilis is a sexually transmitted disease caused by the bacterium Treponema pallidum, and can cause serious long-term complications and/or death if not properly treated\(^1\). Syphilis can be transmitted through direct contact with a syphilis lesion during anal, vaginal, and oral sex. It can also be transmitted from an infected mother to her unborn baby\(^1\). Symptoms of syphilis in adults are divided into three stages: primary, secondary, and late/latent syphilis.
The primary stage of syphilis involves a single or multiple sores at the location where syphilis has entered the body. The sore is usually painless and resolves in 3-6 weeks – regardless of whether or not the syphilis infection is treated. Secondary stage syphilis may involve skin rashes on the palms of the hands, soles of the feet, and/or sores in the mouth, vagina, or anus. Other symptoms include fever, sore throat, weight loss, and fatigue. These symptoms may also resolve without treatment. However, if secondary syphilis is left untreated, it will progress to latent and late stage syphilis. Latent and late stage syphilis can last for years and may subsequently damage internal organs and potentially cause death.

In 2012, the Houston Department of Health and Human Services (HDHHS) declared a syphilis outbreak in Houston/Harris County after observing a 97% increase in the number of primary and secondary syphilis infections compared to the same time period in 2011\textsuperscript{2,3}. Research suggests that men who have sex with men (MSM) and who use social networks to find sex partners drive the majority of new syphilis cases\textsuperscript{4}. Additionally, more than 1/3 of Houstonians with a new syphilis infection also have HIV\textsuperscript{3}. As a result of the syphilis outbreak, the HDHHS has implemented a Syphilis Outbreak Response (SOR) plan\textsuperscript{2}.

To date, the HDHHS has informed the community of the syphilis outbreak, expanded HDHHS STD clinic hours, provided treatment in non-traditional settings – including outreach and field settings, and they have employed protocols in STD clinics which helps to identify new syphilis cases. The SOR has also improved STD intervention activities with community-based organizations, deployed mobile STD clinics, created special programs to target high-risk populations such as inmates in the Harris County Jail, and they’ve developed a community calendar to identify community activities and screening events.
Legacy Community Health Services has also initiated a response to the syphilis outbreak by creating the Syphilis Elimination Advisory Council (S.E.A.C.) \(^5\). S.E.A.C. is a community group that focuses on identifying key strategies to eliminate syphilis from Texas communities. Such strategies include “increasing awareness of and mobilizing community involvement and resources in the elimination of syphilis, facilitating more effective communication regarding syphilis elimination, and identifying gaps in services and barriers to accessibility of services for at-risk individuals”\(^4\). S.E.A.C., in partnership with the Public Health and Education Department at Legacy has increased its efforts by offering free tests and educating people on how to practice safe sex and stay healthy.

It is critical that S.E.A.C. and Legacy target areas where the spread of syphilis is most prevalent. Therefore, the purpose of this project was to identify the prevalence of syphilis infections by zip code. Identifying these geographical areas will assist the S.E.A.C. and Legacy Community Health Services in deploying resources to these communities in efforts to provide education and screening to these high-risk populations. Additionally, it is my goal that the Public Health and Education Department at Legacy can use this information to explore the social/sexual networks of these high-risk populations in efforts to identify trends regarding sexual behavior. Specifically, they can identify what social networks are used to find sexual partners, and potentially track the individuals that are responsible for spreading this disease.

**Methodology**

A literature review was performed to gather background information about syphilis in general and about the syphilis outbreak in Houston/Harris County, specifically. Then, an inquiry of Legacy’s electronic medical records system (Centricity) was performed to identify the number
of syphilis infections by zip code and by sex, race/ethnicity, and HIV co-infection in Houston/Harris County among all active patients at Legacy Community Health Services. Within
the Quality & Report application in the Centricity system, the queries were as follows:

- **Syphilis cases by zip code** – “Find ‘Patients’ Where ‘Problem Code, Active (Diagnosis lookup)’ ‘is’ ‘Syphilis (ICD-097.9)’” AND “Find ‘Patients’ Where ‘Zip Code’ is ‘770##’.”

- **Syphilis cases by zip code and sex** – “Find ‘Patients’ Where ‘Problem Code, Active (Diagnosis lookup)’ ‘is’ ‘Syphilis (ICD-097.9)’” AND “Find ‘Patients’ Where ‘Sex’ ‘is’ ‘Male/Female’” AND “Find ‘Patients’ Where ‘Zip Code’ is ‘770##’.”

- **Syphilis cases by zip code, sex, and an HIV diagnosis** – “Find ‘Patients’ Where ‘Problem Code, Active (Diagnosis lookup)’ ‘is’ ‘Syphilis (ICD-097.9)’” AND “Find ‘Patients’ Where ‘Sex’ ‘is’ ‘Male/Female’” AND “Find ‘Patients’ Where ‘Zip Code’ is ‘770##’” AND “Find ‘Patients’ Where ‘Problem Code, Active (Diagnosis lookup)’ ‘is’ ‘HIV (ICD-042)’.”


- **Syphilis cases by zip code, sex, and White, Hispanic/Latino** – “Find ‘Patients’ Where ‘Problem Code, Active (Diagnosis lookup)’ ‘is’ ‘Syphilis (ICD-097.9)’” AND “Find ‘Patients’ Where ‘Sex’ ‘is’ ‘Male/Female’” AND “Find ‘Patients’ Where ‘Zip Code’ is ‘770##’” AND “Find
‘Patients’ Where ‘Race’ ‘is’ ‘White’” AND “Find ‘Patients’ Where ‘Ethnicity’ ‘is’ ‘Hispanic/Latino’.”

The cut-off date for this query was June 30, 2014. This query included a search of all 97 zip codes in Houston/Harris County and did not include Houston P.O. Box zip codes. The prevalence was calculated by comparing the number of cases to the population according to the 2010 Census tract for that zip code\(^6\). The data was exported and analyzed in an Excel spreadsheet. The geographic locations of the Legacy STD testing centers were also identified to examine whether these centers were ideally located in the same high-risk communities as identified by the Centricity inquiry. A map of the geographic locations was created that illustrated where \( \geq 29 \) syphilis cases were reported in Centricity. This map was designed to analyze trends in terms of the community demographics.

**Results**

The Centricity inquiry produced a total of 1,282 syphilis cases in Houston/Harris County that were diagnosed up to June 30, 2104 (Appendix A). Among the 1,282 reported cases, 1,165 (91\%) were male; 1,023 (88\%) of those males are HIV+; 530 (41\%) are Black; 373 (29\%) are Hispanic/Latino; and 317 (25\%) are White – see Appendix B. The overall prevalence of syphilis among the 97 zip codes in Houston/Harris County is 4.40\%. The majority of the syphilis diagnoses (98 cases;7.64\%) were within the 77006 zip code with a prevalence of 0.5\%. This is the Midtown/Montrose neighborhood of Houston and is colloquially known as the ‘Gay Neighborhood.’ Of the 98 reported cases, 96 (98\%) were male, and 83 (86\%) of those males were HIV+. Additionally, 57 (58\%) were White, 32 (33\%) were Hispanic/Latino, while 9 (9\%) were Black.
Other zip codes that reported ≥29 syphilis cases included 77063 (Mid West neighborhood); 77004 (Greater 3rd Ward); 77036 (Sharpstown); and 77057 (Greater Uptown/Mid West) with prevalence rates of 0.13%, 12%, 0.05%, and 0.10%, respectively. A total of ten zip codes had ≥29 syphilis reported cases. The geographic locations of these ten zip codes were highlighted on a map (Appendix C) and illustrate a clustering effect, as many of these zip codes are adjacent to each other. Three zip codes were identified in the mid- and southwest regions of Houston/Harris County, six zip codes are located within the I-610 loop, and one outlier exists within the 77088 zip code called Acres Home in northwest Houston. Acres Home reports 32 cases of syphilis with the majority of cases among HIV+ Black males.

There were other zip codes that reported less than 29 syphilis cases, but they demonstrated a similar clustering effect in regards to location. Specifically, the 77021, 77045, and 77051 zip codes were adjacent to each other and adjacent to the 3rd Ward neighborhood and reported similar prevalence rates (0.05-0.09%). Similarly, northwest Houston zip codes 77060 and 77067 are adjacent zip codes with similar prevalence rates. More importantly, these zip codes as well as others near the 5th Ward and mid- and southwest Houston also report the highest percentages of syphilis cases among HIV+ Black males (67-97%).

According to the testing calendar, Legacy offers testing services at twelve different testing sites. Two of the sites include the Legacy Montrose and Lyons clinics. Appendix D lists the names of the testing centers and their zip codes. Ten of the 12 testing centers are located in, or adjacent to the Midtown/Montrose neighborhood and include Legacy’s Montrose clinic as well as LGBT-friendly bars/nightclubs, and bathhouses for gay and bisexual men. The Legacy Lyons clinic is located in Houston’s 5th Ward and also offers STD testing.
Discussion

The purpose of this project was to identify the prevalence of syphilis infections by zip code, in efforts to identify demographic trends among high-risk populations. An important goal of this study was to identify gaps in, and barriers to services for these populations, with hopes that Legacy Community Health Services will re-deploy its resources to these high-risk areas. The Midtown Montrose neighborhood of Houston (77006) – where the Legacy Montrose clinic is located – reported the highest number of syphilis cases (98 cases). The majority of these cases were among White males. Additionally, 86% of males with syphilis in the 77006 zip code are also co-infected with HIV. However, the highest percentage of syphilis cases in Houston/Harris County was among HIV+ Black males. Many of these cases were in areas where Black males accounted for 67-97% of syphilis cases in their respective zip codes.

It is important to understand why there is such a high rate of co-infection of syphilis and HIV among men who have sex with men. It is speculated that men who are knowingly HIV+, are having sex with men who are also HIV+, and they are having unprotected sex because they’re not concerned with contracting HIV. Unfortunately, this behavior does not protect against other STDs like syphilis. Additionally, having unprotected sex can increase the risk of exchanging a mutated and/or drug-resistant strain of HIV.

The majority of community resources aimed at providing STD testing are located in or near the Montrose neighborhood. This is appropriate given the fact that this neighborhood reports the highest number of syphilis cases. However, the results of this project indicate that STD screening and education services are needed in other areas in Houston – particularly in the Black community where the percentage of syphilis cases is the highest. It may be possible that
testing center and resources are absent in those neighborhoods. Conversely, there may be other testing centers available in these neighborhoods, but people seek treatment primarily from Legacy. In this case, it may be beneficial for Legacy to establish testing centers in these high-risk communities, or form partnerships with existing community resources in efforts to have a more effective presence in these communities.

The small percentage of MSM who are not HIV+ but have a history of syphilis should not be ignored. These individuals represent an extremely vulnerable population, as they are at high risk of acquiring HIV. It would be beneficial to follow these individuals longitudinally to know if and/or when they seroconvert. It is critical that prevention measures be targeted to this population so as to prevent them from becoming HIV+. Such measures could include outreach endeavors like providing education about safer sex practices, or more aggressive measures like encouraging these patients to begin pre-exposure prophylaxis (PrEP). PrEP is given to individuals who are not HIV+, but are at substantial risk for getting HIV. These individuals take a pill everyday called Truvada, which contains two medications (tenofovir and emtricitabine) that are used in combination with other medications to treat HIV. According to the CDC, PrEP has been shown to reduce the risk of HIV among high-risk people by up to 92% when taken consistently.

This study was limited to active patients within Legacy’s Centricity electronic medical records. It does not include patients who receive testing (but not treatment) from Legacy’s testing centers. This study also does not include syphilis cases that are tracked by and reported to the HDHHS and/or other medical clinics that test for and treat syphilis. Therefore, cases and prevalence rates of syphilis in Houston/Harris County (that are reported by Legacy) are
underestimated. The results of this study are also slightly underestimated as they did not account for re-infection cases among active patients in Centricity.

**Recommendations**

It is recommended that Legacy continue to expand its prevention measures regarding syphilis – particularly among men who have sex with men. More importantly, it is recommended that Legacy expand these resources to Black men in their respective communities, since these men seek treatment from Legacy Community Health Services. Such prevention measures should include: 1) establishing testing centers in other high-risk communities beyond the Montrose area; 2) encouraging safer sex practices (e.g. using latex condoms and encouraging monogamy); 3) promoting awareness and screening regarding syphilis and other STDs; and 4) encouraging people to notify their sex partners to get tested and treated for syphilis infections. People who do not have HIV but are at high risk of acquiring HIV should receive more aggressive prevention methods, such as taking PrEP, in efforts to decrease their risk of seroconverting.

It is also recommended that Legacy use the information from this project to further explore the social/sexual networks that may play a role in promoting risky sexual behaviors. For example, social media sites like Grindr and Adam2Adam are smartphone apps that are geared towards gay, bisexual, and bi-curious men. Grindr, in particular, uses a location-based service that allows users to locate other men within close proximity. Perhaps a screening tool can be developed and distributed at testing sites to assess whether men are using these web applications to meet and have sex with men.

**Conclusion**
Houston/Harris County, TX has witnessed a dramatic increase in the prevalence of syphilis since 2012. The results of this study suggest that the majority of syphilis cases are reported among Black men, men who have sex with men. Additionally, most of these men are also co-infected with HIV. It is critical to continue to provide screening, treatment, and education to these individuals. It is equally important for public health officials to re-asses their outreach initiatives to ensure that they are effectively targeting high-risk populations.

References


## Appendix A

### Syphilis Inquiry Results

<table>
<thead>
<tr>
<th>Zip Code</th>
<th>Neighbourhood</th>
<th>2002 Population</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>77001</td>
<td>Pearlmoor</td>
<td>22464</td>
<td>35%</td>
<td>20%</td>
<td>34%</td>
<td>11%</td>
</tr>
<tr>
<td>77002</td>
<td>North Forest</td>
<td>22439</td>
<td>43%</td>
<td>20%</td>
<td>34%</td>
<td>3%</td>
</tr>
</tbody>
</table>

For more detailed results, please refer to the tables provided in the document.
## Appendix B
Houston/Harris County Syphilis Demographics

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Syphilis Cases</td>
<td>1282</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1165</td>
<td>91%</td>
</tr>
<tr>
<td>Male, HIV+</td>
<td>1023</td>
<td>88%</td>
</tr>
<tr>
<td>Female</td>
<td>117</td>
<td>9%</td>
</tr>
<tr>
<td>Female, HIV+</td>
<td>45</td>
<td>38%</td>
</tr>
<tr>
<td>White, Not Hispanic/Latino</td>
<td>317</td>
<td>25%</td>
</tr>
<tr>
<td>Black, Not Hispanic/Latino</td>
<td>530</td>
<td>41%</td>
</tr>
<tr>
<td>White, Hispanic/Latino</td>
<td>373</td>
<td>29%</td>
</tr>
<tr>
<td>Other Race/Ethnicity</td>
<td>62</td>
<td>5%</td>
</tr>
</tbody>
</table>
Appendix C
Geographic Locations of ≥29 Syphilis Cases per Zip Code

<table>
<thead>
<tr>
<th>Zip Code</th>
<th>Neighborhood</th>
<th>Syphilis Cases</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>77006</td>
<td>Neartown-Montrose/Midtown</td>
<td>98</td>
<td>0.50%</td>
</tr>
<tr>
<td>77063</td>
<td>Mid West</td>
<td>45</td>
<td>0.13%</td>
</tr>
<tr>
<td>77004</td>
<td>Greater 3rd Ward</td>
<td>39</td>
<td>0.12%</td>
</tr>
<tr>
<td>77036</td>
<td>Sharpstown &amp; Braeburn</td>
<td>39</td>
<td>0.05%</td>
</tr>
<tr>
<td>77057</td>
<td>Greater Uptown &amp; Mid West</td>
<td>38</td>
<td>0.10%</td>
</tr>
<tr>
<td>77008</td>
<td>Lazy Brook/Timbergrove &amp; Greater Heights</td>
<td>34</td>
<td>0.11%</td>
</tr>
<tr>
<td>77019</td>
<td>River Oaks, Neartown-Montrose</td>
<td>32</td>
<td>0.17%</td>
</tr>
<tr>
<td>77088</td>
<td>Acres Home</td>
<td>32</td>
<td>0.06%</td>
</tr>
<tr>
<td>77009</td>
<td>Greater Heights &amp; Northside Village</td>
<td>29</td>
<td>0.08%</td>
</tr>
<tr>
<td>77020</td>
<td>Greater 5th Ward &amp; Denver Harbor/Port Houston</td>
<td>29</td>
<td>0.11%</td>
</tr>
</tbody>
</table>
Appendix D
Legacy Community Health Services STD Testing Centers and Zip Codes

1. Legacy Montrose Clinic – 77006
2. Legacy Lyons Clinic – 77020
3. Midtowne Spa (Bathhouse for Gay/Bisexual men) – 77004
4. Walgreens Montrose Blvd – 77002
5. Club Houston (Bathhouse for Gay/Bisexual men) – 77002
7. Ripcord (LGBT-friendly bar) – 77006
8. George’s (LGBT-friendly Country Sports bar) – 77006
9. TC’s Showbar (Drag Show Nightclub) – 77006
10. Tony’s Corner Pocket (LGBT-friendly Bar/Nightclub) – 77092
11. Neon Boots (LGBT-friendly dancehall) – 77092
12. Bayou City (LGBT-friendly bar) – 77006