

Incidence of Gonorrhea and Chlamydia in Urban Settings: The Case for Neighborhood Level Analysis in Boston

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Abstract

The sexually transmitted infections (STIs) gonorrhea and chlamydia are known to disproportionately affect impoverished communities and communities of color, especially in urban areas. Moreover, socioeconomic and demographic factors such as poverty and race/ethnicity may contribute to a difference in treatment setting choice as well as a delay in care seeking. In an urban metropolitan area such as Boston, the overall gonorrhea and chlamydia rates are higher than national rates, and such differences are even more marked in certain neighborhoods with greater proportions of individuals who are impoverished, young, and of color. Using a retrospective analysis of city wide data, we highlight the effects of socioeconomic and demographic variables on urban STI prevalence. High poverty rates, race/ethnicity and younger adult populations are linked to disproportionately high STI rates. Interestingly, STI rates do not appear to be influenced by the universal health care coverage offered to the whole Massachusetts' resident populations. We examine the effects of these variables in Boston neighborhoods in conjunction to STI rates and hypothesize that the observed rates are underestimates of the true prevalence of infection. Future studies will investigate how these same socioeconomic and demographic factors influence which treatment settings are chosen and subsequently lead to a delay in treatment.

Keywords

Gonorrhea, Chlamydia, Social Determinants of Health, Poverty, Boston

1. Introduction

Parts of many urban areas in the United States have documented unacceptable societal conditions: widespread

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poverty, racial segregation, dilapidated housing, high crime rates, and the breakdown of family structures. Unfortunately, these harsh realities are not the only hardships experienced in these neighborhoods. Gonorrhea and chlamydia are known to disproportionately affect urban dwellers who are poor, people of color, and under 25 years of age [1]. Poor sexual health outcomes in these populations are influenced largely by social and demographic characteristics of urban life, greatly increasing the risk that these individuals become infected. Consequently, when a neighborhood has a higher prevalence of these infections, individuals within the population are at higher risk of contracting these sexually transmitted infections (STIs) even with fewer sexual encounters, thus perpetuating the spread of infection.

Chlamydia and gonorrhea are the two most commonly reported STIs, respectively, in the United States [2]. Based on surveillance done at the local level, over 1.4 million cases of chlamydia and 320,000 cases of gonorrhea were reported to the Centers for Disease Control and Prevention (CDC) in 2011 [3]. However, due to the surprisingly high frequency of asymptomatic infections for both STIs, the CDC estimates that 2.86 million chlamydia and 820,000 gonorrhea infections occur each year [3]. On the national scale, both infections disproportionately affect young people and people of color. Biological causes such as increased cervical ectopy in young females and differences in the vaginal microbiome between races can be cited as contributors to the higher disease burden in these groups [4] [5]. Behaviorally, young people are more likely to exhibit risky sexual behaviors, while the incidence of concurrent sexual partners has been reported more frequently in African American communities for a number of reasons [6] [7]. Because of the increased risk of infection for young individuals, CDC guidelines recommend annual screening of all sexually active females under twenty-five years, with more frequent screening to be done in men and women with additional risk factors [3].

It is likely that all STIs are under reported, partly because many cases are asymptomatic. The CDC reports that only 10% of men and 5% - 30% of women with chlamydia infection develop symptoms and that gonorrhea infection mimics these trends [3]. If an individual lacks symptoms, he or she is unlikely to seek treatment, especially in the absence of education about how to prevent infection and the need for annual testing with additional testing necessary after risky sexual encounters. Electronic laboratory reporting to public health agencies, introduced in the past several years, has undoubtedly identified some cases that previously would have likely gone unreported. However, no data are available to indicate whether under reporting is more common in some neighborhoods and whether population screening rates differ in various neighborhoods.

2. Boston's Poverty Profile

Of the 625,000 people who live in Boston, 23% live at or below the poverty line compared to the national average of 15% [8]. The fact that poverty in Boston is linked to low educational attainment may contribute to the disproportionately high rates of gonorrhea and chlamydia in its poorest neighborhoods. Boston's knowledge economy, influenced heavily by its plethora of colleges and universities, rewards the highly educated and prevents those with less education from finding work, increasing the barriers to good health care [9]. Roxbury, North and South Dorchester, and Mattapan are four of Boston's poorest neighborhoods with 37%, 30%, 21%, and 17% of families living below the poverty line, respectively [8]. Up to 25% of these residents lack a high school diploma [8]. Poverty also correlates with race in Boston; white individuals in Boston historically have had poverty rates well below the Boston average while communities of color, including black and Latino residents, have largely lived below the poverty line especially in the previously mentioned neighborhoods [8].

3. Chlamydia and Gonorrhea Rates in Boston Neighborhoods

Boston's chlamydia and gonorrhea rates are higher than those of the United States as a whole. There were 778 chlamydia cases per 100,000 in Boston in 2011, an 18.1% increase from 2008 and 70% higher than the national rate of 457.6 per 100,000 (95% CI = 65% - 75%) [2] [10]. The rate of gonorrhea decreased in 2011 relative to that reported in 2010 with 110 cases per 100,000 in 2011, but the rate in Boston is still slightly elevated compared to the 104.2 per 100,000 nationally [2] [11].

Analyzing Boston data as a whole without focusing in on neighborhood level rates masks the urgency of this problem in some communities. Our neighborhoods of interest, Roxbury, North and South Dorchester, and Mattapan exhibit STI rates much greater than Boston-wide rates. These neighborhoods exhibit rates about twice as large as the already elevated Boston rates. However, higher income neighborhoods such as Back Bay act as a dilution factor, reducing the overall STI rates and hiding the highly localized pockets of increased incidence.

Thus, it is clear that a neighborhood specific focus must be applied when trying to meaningfully reduce STI rates.

4. Social Determinants of Health

In the past decade, social determinants of health have been identified as crucial to understanding and addressing health inequities [12]. Recent research has demonstrated that patterns and distribution of STIs are influenced by social and structural environmental factors including income and social status [13] [14]. Undoubtedly, the interaction of many factors such as poverty, race, ethnicity, and age contribute to the significant disparities found in Boston. According to the 2011 American Community Survey five-year estimates completed by the United States Census, Roxbury is the poorest neighborhood in Boston with 37% of its population living below the poverty line. Almost 82% of its inhabitants belong to a community of color, and 47% of its population is under 25 years old compared to 36% of the overall Boston population [15] [16]. In 2011, the reported chlamydia incidence rate for Roxbury was 1367 cases per 100,000 individuals, 76% higher than the overall Boston rate of 778 cases per 100,000 individuals (95% CI = 61%, 92%). The gonorrhea rate was also significantly higher than the Boston average at 185 cases per 100,000, which is 66% higher than the overall Boston rate of 110 cases per 100,000 (95% CI = 32%, 113%). In contrast, Back Bay is one of Boston's richest neighborhoods where only 13% of people are living below the poverty line. Almost 80% of Back Bay residents are white, and 24.9% are under 25 years old. In 2011, this neighborhood had significantly lower STI rates than the city overall, with a chlamydia rate of 290 cases per 100,000, 63% lower than the city rate (95% CI = 56%, 68%). The gonorrhea rate was 55% lower than the city rate at 50 cases per 100,000 (95%, CI = 33%, 70%).

5. Conclusions

Lack of health insurance and subsequent lack of access to health care has been postulated as a rationale for poor health outcomes [17] [18]. However, in 2006, Massachusetts passed a health care insurance reform law with the intent of achieving nearly universal health insurance coverage for all of its residents [19]. By 2008, 97% of Boston residents had health care coverage with data from 2006 and 2008 demonstrating that no neighborhood had less than 90% coverage, and the percentage of adults in these neighborhoods with coverage was statistically similar to Boston overall [20]. Even as the Affordable Care Act rolls out, it appears from the Boston experience that health insurance alone will be insufficient to significantly reduce disease rates.

The nature of social networks in low socioeconomic status urban communities contributes to the observed greater incidence of STIs in Boston's poorest neighborhoods. These networks also put certain demographic groups at higher risk. Racial and socioeconomic segregation has been suggested as a driver of the maintenance of high incidence of STIs in poor urban neighborhoods [21]. Poverty and people of color are largely sequestered in our neighborhoods of interest (Roxbury, North and South Dorchester, and Mattapan) compared to other Boston communities and Boston as a whole. This socioeconomic context sets the stage for detrimental sexual networks that maintain high rates of STIs. In poor neighborhoods like those in Boston, sex is often used as currency that can be traded for money, drugs, or social capital, increasing the risk of transmitting STIs within the community [14].

The geographic clustering of high-risk individuals that is created by racial and socioeconomic segregation puts black women at much greater risk for contracting STIs [14]. For a number of reasons, black women are more likely than white women to have concurrent sexual partners, especially with members of their own race [7] [14] [22]. This behavior, combined with the increased frequency of other high risk sexual behaviors observed in urban poor settings, elevates the risk of black women contracting STIs. These phenomena are reflected in the observed STI rates in Boston, where black women have the highest rates of gonorrhea and chlamydia infection compared to any other group [10] [11].

When evaluated on a neighborhood level it is clear that in Boston, as is likely the case in other urban areas, socioeconomic and demographic factors such as poverty, racial/ethnic status, and age correlate with gonorrhea and chlamydia incidence rates. The specific mechanism by which these factors may directly create negative health outcomes is unknown, and raises important questions for future research. Which particular factors most influence the epidemiology of these STIs? How do these factors play into the frequency of co-infection with gonorrhea and chlamydia? What is the most important next step to eliminate the disparities that have been identified? What role should healthcare providers and public health agencies play? What other partners should be

involved? These questions are just a few examples of future areas of research in public health and sexually transmitted infections.

6. Summary

Disparities in gonorrhea and chlamydia rates exist in Boston's neighborhoods, despite Massachusetts' universal health care for all citizens. These localized pockets of high incidence are diluted by city-wide statistics.

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Potential Conflicts of Interest

All authors reported no conflicts.

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