Title Page

**Sexually Transmitted Infection Rates Among Sexual Minority U.S. Women Aged 15 to 44 Years Who Participated in the National Survey for Family Growth**

by

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Abstract

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**Sexually Transmitted Infection Rates Among Sexual Minority U.S. Women Aged 15 to 44 Years Who Participated in the National Survey for Family Growth**

Hanna Edvardsson, MPH

University of Pittsburgh, 2019

**Abstract**

Sexual minority individuals are an underserved and understudied population in the United States. However when comparing sexual minority women to men there are fewer interventions and studies for women when looking sexually transmitted infections (STis). There is some conflicting data regarding sexual health outcomes amongst sexual minority women, especially lesbians. This paper utilized data from two waves (2011-2013 and 2013-2015) of the National Survey for Family Growth (NSFG) in order to look for potential STI disparities at a national level in sexual minority women compared to heterosexual women.

The final analytical sample was 5,521 for the 2011-2013 cohort and 5,623 for the 2013-2015 cohort. A logistic regression was used in order to produce odds ratios of pairwise differences to compare heterosexual STI outcomes to bisexual and lesbian outcomes.

My research findings indicate statistically significant disparities between bisexual and heterosexual women in diagnosis of an STI in the last 12 months, lifetime chlamydia, and lifetime syphilis consistent across both waves of the NSFG. Lesbian women were found to have a statistically significant disparity in lifetime syphilis outcomes in the 2011-2013 wave and had the highest odds ratio of any group (OR=5.2). Despite this strong disparity in the earlier wave, the disparity was not present in the 2013-2105 wave. Small sample sizes and lower power for the sexual minority groups, lesbians in particular, may have resulted in unstable estimates which resulted in inconsistencies across waves.

Despite the limitations of this study, there is still statistically significant evidence showing that there is a disparity between bisexual and heterosexual women in STI outcomes. This is of public health importance as many STis have been on the rise in recent years and some, such as chlamydia, are becoming even harder to treat with antibiotics. If these disease are not addressed early enough there will be public health consequences down the road. Since bisexual women are disproportionately affected by STis, it is important to figure out what is causing the disparities and how we can address them and reduce the rates of STis in bisexual, as well as lesbian, women.

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# Introduction

Sexually transmitted infections (STIs) are a significant global public health issue. According to the World Health Organization’s (WHO) 2018 surveillance report on global STIs, there were 127 million new cases of chlamydia, 87 million new cases of gonorrhea, and 6 million new cases of syphilis.17 In the United States population alone, gonorrhea, syphilis, and chlamydia accounted for 2.3 million cases in 2017, a 31% increase from 1.8 million in 2013. 1 From 2013-2017 the overall rate of STIs in the United States continued to rise. The cases of syphilis nearly doubled and cases of gonorrhea increased by 67% within this timeframe. Rates of chlamydia in the population have remained at record highs and there continue to be concerns about antibiotic resistance in chlamydia, as well as other bacterial STIs including gonorrhea.1  The number of cases reported represents only a part of the actual burden of disease, due to the asymptomatic nature of several STIs such as chlamydia. Undiagnosed, and therefore untreated, STIs can lead to severe adverse effects including pelvic inflammatory disease, infertility, ectopic pregnancy, and increased risk of HIV aquisition.1

As STIs continue to rise, certain populations are disproportionately affected. Healthy People 2020 cites disparities among individuals by race and ethnicity, socio-economic status (SES), and access to health services.2 In addition to these populations, the Lesbian, Gay, Bisexual, Transgender, and Queer+ (LGBTQ+) population has also been disproportionately impacted. The term sexual-minority refers to individuals who identify their sexuality as something other than heterosexual, which includes the L, G, B, and Q+ parts of the LGBTQ+ community. Across all racial and ethnic groups, sexual-minority women have been found to engage in higher risk sexual behaviors (e.g. high number sexual partners, ever had commercial sex) compared to heterosexual women and are at greater risk for acquiring an STI, with the highest rates among women who engage in sexual behaviors with both men and women.3

Bisexual, and lesbian women may be at greater risk for STIs as they have been reported to be more likely to engage in higher risk sexual behaviors compared to heterosexual women. The National Longitudinal Study of Adolescent Health (NLSAH) developed population-based estimates of STI risk factors through several waves in 11,045 young adults (24-32 years, mean age 29 years at the 4th Wave of the study) and compared these risk factors and STI outcomes by sexual orientation.3 Compared to heterosexual women, sexual minority women in every racial and ethnic group had a greater prevalence of high-risk sexual behavior factors. These risk factors were categorized as “behavior factors” but some were life events and included incarceration, history of multiple partners, and forced sex. In contrast to prior studies which grouped women by lesbian/gay and bisexual sexual identity, this paper additionally focused on “mixed-orientation” women, who would be most similar to women historically defined as bisexual because they are not exclusively attracted to only men or women. Mixed-orientation women were more likely to receive an STI diagnosis compared to both heterosexual and lesbian women. In this study, lesbian white women had a significantly lower reported rate of a lifetime STI history at wave 4 compared to heterosexual white women (13% vs 29% respectively, p<.05).3

While some studies have found lower rates of STIs in lesbian women, a study conducted within family planning clinics in the pacific northwest found both STI acquisition and STI sequelae are more common among sexual minority women.4 In this study conducted across 9,358 family planning clinic visits, women aged 15 to 24 years old who either reported having sex with women exclusively (WSW) or having sex with men and women (WSMW) were tested for *Chlamydia trachomatis,* and rates of infection were compared by sexual orientation. *C. trachomatis* infections were identified using nucleic acid amplification testing (NAAT) (sensitivity 96.0%-100%, specificity 98.8%-100%) for half of participants (49.3%). Other non-NAAT methods of testing included enzyme immunoassay (29%), nucleic hybridization test (10%), nucleic acid hybridization assays (9%), and cell cultures (3%). *C trachomatis* infections were found among 7.1% of women who reported having sex with women exclusively (WSW) and women who reported having sex with men and women (WSMW). This compares to a rate of 5.3% among women who have sex with men exclusively (WSM).4 Unlike the lesbian participants in the previously discussed NLSAH cohort, WSW were found to have higher rates of STIs, in this case *C. trachomatis* infections specifically. This difference demonstrates there is conflicting evidence amongst existing studies regarding lesbian STI acquisition and highlights the need for further research on modes of transmission among WSW. Risk factors for *C. trachomatis*, including younger age, non-white race, and behavioral risks (e.g. new sexual partner, multiple sexual partners, a symptomatic sexual partner) were comparable across groups. Even with other risk factors (e.g. young age, non-white race, report of any sexual risk behaviors in past 60 days) comparable, the sexual minority women had a higher rate of STIs.

Several studies have looked at sexual minority status and STI outcomes. A 2008 paper utilizing data from the 2002 National Survey for Family Growth (NSFG) examined sexual orientation and viral STI rates among American women aged 15 to 44 years old. 8 The study utilized different categories of sexual orientation including: sexual orientation on the basis of sexual behavior in the past 12 months, sexual orientation on the basis of sexual identity, and sexual orientation on the basis of sexual behavior and sexual identity. Viral STIs were more prevalent in bisexual women compared to lesbian women across all definitions of sexual orientation. Heterosexual women had viral STI rates that were lower than rates among bisexual individuals and higher than the rates among lesbian women.8 A limitation of this study is the lack of analysis of other prominent STIs, such as syphilis or gonorrhea, which are available in the NSFG database. Despite this limitation, the study is still an important stepping stone to understanding how sexual minority women are impacted by viral STIs and was the earliest study using the NSFG to explicitly examine sexual health disparities among these women of different sexual orientations. One limitation of this study, and many studies that look at sexual minority women and STI outcomes, is it’s cross-sectional approach, which limits researchers from examining changes in rates of infections over time. However, since the NSFG is administered every two years, there is an opportunity to look at changes in STIs over time at a population level.

In this current analysis, I propose to compare past 12 month and lifetime rates of several STIs including gonorrhea, chlamydia, genital herpes, genital warts, and syphilis, as well as potential STI risk factors among lesbian, bisexual, and heterosexual women utilizing two sets of NSFG data; the 2011-2013 and 2013-2015 data sets.7 Since 2002, the NSFG has collected data on sexual orientation (heterosexual, gay/lesbian, and bisexual) and is one of just eight national surveys that collect data on sexual orientation.10 The NSFG survey also collects data on several STI outcomes and a number of potential risk factors,7including income, education, age, race, number of live births, and sexual behaviors and related outcomes. Thus, the NSFG is an ideal source for comparing prevalence and risk factors for STIs over time by sexual orientation. Based on previous literature, I hypothesize that bisexual women will be disproportionately diagnosed with STIs compared to their heterosexual counterparts while lesbian women will have lower rates.

# Methods

## National Survey for Family Growth

Data from the 2011-2013 and 2013-2015 periods of the National Survey for Family Growth (NSFG) were used to examine disparities in STI outcomes of lesbian and bisexual women compared to heterosexual women. These time periods were selected as questions regarding sexual identity were consistently worded without changes as compared to previous and future years. Additionally, previous studies had different time frames for data collection (i.e. just one year for the 1995 and 2002 surveys and four years for the 2006-2010 survey) while the chosen sets both had two years of data collection. The NSFG is a continuous probability survey, meaning it samples each quarter over the sample time period. It includes members of the non-institutionalized United States population and is based on a multi-stage stratified clustered sampling frame using households in 110 primary sampling units. These sampling units were chosen to be representative of the entire United States population of men and women aged 15 to 44 years old.9 Therefore, the analyses were limited to women aged 15 to 44 years old. While individuals outside this age range can still suffer from STIs, the NSFG only captures individuals in this age range. Beginning in September 2015, future surveys will be expanded to include individuals up to 49 years of age. The survey is administered at an individual’s household by a trained interviewer. All of the interviewers were women and would sample one age-eligible individual from each household. If the selected respondent was a minor (15-17 years old), a signed informed consent and permission was first obtained from the parent before talking to the individual.8

## Cohort Creation

For the 2011-2013 cohort, there were a total of 10,416 individual respondents. Of these individuals, 53.8% were women, who had an overall response rate of 73.4% compared to 72.1% for men. Of the women who responded to the survey, 5,533 individuals responded to the sexual identity questionnaire. Of those respondents, 5,521 answered all of the questions regarding sexual health history and these women made up the final analytical sample for the 2011-2013 cohort.

In the 2013-2015 cohort, there were a total of 10, 210 individual respondents, of which 55.9% were women. Men in this cohort had a response rate of 67.1%, while women had a response rate of 71.2%. The sample included the 5,639 women who responded to the sexual identity questionnaire. Of those individuals, 5,623 answered all of the sexual health history questions examined in this study. Thus, the final analytical sample for the 2013-2015 cohort was 5,623 individuals. The total sample size of the combined cohorts is 11,144 women.

## Outcome Variables

Self-reported information on STIs was measured by questionnaire. Participants were asked the following yes/no questions:

* In the last 12 months, have you been treated or received medication from a doctor or other medical care provider for a sexually transmitted disease like gonorrhea, chlamydia, herpes, or syphilis? (Any STI (last 12 months))
* In the last 12 months, have you been told by a doctor or other medical care provider that you had gonorrhea? (Gonorrhea (last 12 months))
* In the last 12 months, have you been told by a doctor or other medical care provider that you had chlamydia? (Chlamydia (last 12 months))
* At any time in your life, have you ever been told by a doctor or other medical care provider that you had genital herpes? (Genital herpes (lifetime))
* At any time in your life, have you ever been told by a doctor or other medical care provider that you had genital warts or human papillomavirus also called HPV? (Genital warts (lifetime))
* At any time in your life, have you ever been told by a doctor or other medical care provider that you had syphilis? (Syphilis (lifetime))

## Risk Factors

Potential risk factors associated with STI acquisition were assessed by questionnaire and include the following: education level, sex education, income, insurance status, marital status, and age. The specific questions pertaining to these factors are as follows:

* Which category represents your total (weekly/monthly/yearly) earnings before taxes (on your last job)? (Income)
* Now I'd like to ask about marital status and living together. Please look at Card 1. What is your current marital or cohabiting status? (Marital status)
* How old are you? (Age)
* Card 75 lists some examples of types of health care coverage. In the past 12 months, that is, since [INTERVIEW MONTH, INTERVIEW YEAR – 1], was there any time that you did not have any health insurance or coverage? (Insurance status)

Before you were 18, did you ever have/ Have you ever had any formal instruction at school, church, a community center or some other place about sexually transmitted diseases? (Sex education)

## Statistical Analysis

Overall frequencies were examined in both the 2011-2013 and 2013-2015 wave datasets. Pairwise differences were calculated individual for each STI outcome (any STI, gonorrhea, chlamydia, genital herpes, genital warts, and syphilis) in the presence of the sexual orientation interaction. Then logistic regressions were used to produce odds ratios and 95% CIs utilizing the group of heterosexual women as the referent group. All statistical analyses were conducted using SAS 9.4.

# Results

Among women participating in the 2011-2013 survey, most STIs were reported among heterosexual respondents, driven by the larger number of women in this group (Table 1). However, the frequency of STIs was consistently higher among bisexual women when compared to both heterosexual and lesbian women. They only exception was regarding syphilis rates, for which lesbian women had the highest frequency (2.50%) compared to bisexual women (1.80%) and heterosexual women (0.49%). In the 2013-2015 wave, bisexual women had the highest frequency of STIs compared to heterosexual and lesbian women. However, this was not the case for gonorrhea or genital warts. For rates of gonorrhea in the last 12 months, heterosexual women had the highest frequency (0.92%) and for genital warts heterosexual women had a slightly higher frequency (9.97%) compared to rates among bisexual women (9.56%). Between the 2011-2013 and 2013-2015 waves, diagnosis of any STI in the last 12 months increased across all sexual identities, while the diagnosis of gonorrhea in the last 12 months decreased across all groups. Lesbians had the highest frequency of syphilis in 2011-2013 (2.50%) to the lowest in 2013-2015 (0.00%), with bisexual women now having the highest frequency (1.23%).

Bisexual women in the 2011-2013 wave were 1.7 times as likely to report any STI in the last 12 months compared to heterosexual women (Table 2). For individual STIs, bisexual women were 3.0 times as likely to report gonorrhea in the last 12 months, 2.6 times as likely to report chlamydia in the last 12 months, 1.8 times as likely to report genital herpes in their lifetime, and 3.7 times as likely to report syphilis in their lifetime as compared to heterosexual women. These odd ratios were found to be statistically significant (p<0.05). Comparisons using the 2013-2015 wave data yielded statistically significant differences between bisexual and heterosexual women. These differences included STI diagnoses in the last 12 months (OR=1.7), chlamydia in the past 12 months (OR=1.8), and lifetime syphilis (OR=2.6). Rates of gonorrhea, genital herpes, and genital warts were not significant between groups in 2013-2015. Self-report of lifetime genital warts did not differ by group in either wave. For lesbian women there was a statistically significant association with lifetime syphilis acquisition in the 2011-2013 wave and they were 5.2 times as likely to report a syphilis diagnosis at some point in their lifetime compared to heterosexual women. In the 2013-2015 wave this association was not present. However, lesbians in this wave were 0.4 times as likely to report a lifetime genital warts diagnosis compared to heterosexual women. This was the only statistically significant result amongst all sexual minority women across waves.

Table 3 shows the different distribution of various potential risk factors and how they have changed by NSFG wave. The age of heterosexual, gay/lesbian, and bisexual respondents were similar across waves. Participants who identified as bisexual were on average slightly younger (26.00 years in 2011-2013 and 25.88 years in 2011-2013) compared to heterosexual respondents (28.83 years in 2011-2013 and 29.14 years in 2013-2105). The ages of lesbian women were in between those of bisexual or heterosexual in both waves (27.59 years in 2011-2013 and 28.05 in 2013-2015). Marital status (defined as married to a person of the opposite sex) was highest amongst heterosexual women across both waves (32.15% and 31.79% for 2011-2013 and 2013-2105 respectively). Lesbians had the lowest proportion of marriage (0.00% in 2011-2103 and 3.05% in 2013-2015) while in the 2011-2013 wave 15.95% of bisexual women were married to someone of the opposite sex and 18.63% in the 2013-2015 wave. Formal sexual education was high amongst all groups. In the 2013-2105 wave, over 90% heterosexual, lesbian, and bisexual participants (92.35%, 94%, and 95.50% respectively) received formal STD transmission education. The change in mean age between waves by sexual identity was minimal, and there was not a large difference between groups. Rates of being uninsured in the last 12 months have decreased among heterosexual women (28.27% to 25.45%), lesbian women (35.00% to 27.48%), and bisexual women (34.96% to 27.70%) since the 2011 to 2013 survey. When looking at income, lesbian and bisexual women had a higher proportion of women who made less than $20,000 a year (65.28% in 2011-2013 | 53.51% in 2013-2015 and 68.52% in 2011-2013 | 62.65% in 2013-2015 respectively) compared to heterosexual women (58.20% in 2011-2013 and 51.43% in 2013-2015).

Table 1 Self-reported sexually transmitted infection frequencies among U.S. Women Aged 15-44 in 2011-2013 (N=5,521) and 2013-2015 (N=5,639) waves of the National Survey of Family Growth

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Heterosexual | | Gay/Lesbian | | Bisexual | |
|  | 2011-13 | 2013-15 | 2011-13 | 2013-15 | 2011-13 | 2013-15 |
| Any STI (last 12 months) | 253 (5.01%) | 275 (5.41%) | 1 (1.25%) | 7 (5.41%) | 32 (8.23%) | 36 (8.82%) |
| Gonorrhea (last 12 months) | 53 (1.05%) | 47 (0.92%) | 1 (1.25%) | 1 (0.76%) | 12 (3.08%) | 3 (0.74%) |
| Chlamydia (last 12 months) | 102 (2.02%) | 99 (1.95%) | 1 (1.25%) | 2 (1.53%) | 20 (5.14%) | 14 (3.43%) |
| Genital herpes (lifetime) | 179 (3.54%) | 204 (4.01%) | 2 (2.50%) | 3 (2.29%) | 24 (6.17%) | 21 (5.15%) |
| Genital warts (lifetime) | 477 (9.44%) | 507 (9.97%) | 5 (6.25%) | 5 (3.82%) | 47 (12.08%) | 39 (9.56%) |
| Syphilis (lifetime) | 25 (0.49%) | 24 (0.47%) | 2 (2.50%) | 0 (0.00%) | 7 (1.80%) | 5 (1.23%) |

Table 2 STI rates among US Women Aged 15-44 in 2011-2013 (N=5,521) and 2013-2015 (N=5,639) waves of the NSFG

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2011-2013 | | |  | 2013-2015 | | |
|  | Proportion of Women, n (%) |  | OR (95% CI) |  | Proportion of Women, n (%) |  | OR (95% CI) |
| Any STI (last 12 months) |  |  |  |  |  |  |  |
| *Bisexual* | 32 (8.23%) |  | 1.7 (1.2, 2.5)\* |  | 36 (8.82%) |  | 1.7 (1.2, 2.4)\* |
| *Lesbian* | 1 (1.25%) |  | 0.2 (0.03, 1.7) |  | 7 (5.41%) |  | 1.0 (1.2, 2.4) |
| *Heterosexual* | 253 (5.01%) |  | 1.00 |  | 275 (5.41%) |  | 1.00 |
| Gonorrhea (last 12 months) |  |  |  |  |  |  |  |
| *Bisexual* | 12 (3.08%) |  | 3.0 (1.6, 5.7)\* |  | 3 (0.74%) |  | 0.8 (0.2, 2.6) |
| *Lesbian* | 1 (1.25%) |  | 1.2 (0.2, 8.7) |  | 1 (0.76%) |  | 0.8 (0.1, 6.0) |
| *Heterosexual* | 53 (1.05%) |  | 1.00 |  | 47 (0.92%) |  | 1.00 |
| Chlamydia (last 12 months) |  |  |  |  |  |  |  |
| *Bisexual* | 20 (5.14%) |  | 2.6 (1.6, 4.3)\* |  | 14 (3.43%) |  | 1.8 (1.0, 3.2)\* |
| *Lesbian* | 1 (1.25%) |  | 0.6 (0.9, 4.5) |  | 2 (1.53%) |  | 0.8 (0.2, 3.2) |
| *Heterosexual* | 102 (2.02%) |  | 1.00 |  | 99 (1.95%) |  | 1.00 |
| Genital herpes (lifetime) |  |  |  |  |  |  |  |
| *Bisexual* | 24 (6.17%) |  | 1.8 (1.2, 2.8)\* |  | 21 (5.15%) |  | 1.3 (0.8, 2.1) |
| *Lesbian* | 2 (2.50%) |  | 0.7 (0.2, 2.9) |  | 3 (2.29%) |  | 0.6 (0.2, 1.8) |
| *Heterosexual* | 179 (3.54%) |  | 1.00 |  | 204 (4.01%) |  | 1.00 |
| Genital warts (lifetime) |  |  |  |  |  |  |  |
| *Bisexual* | 47 (12.08%) |  | 1.3 (1.0, 1.8) |  | 39 (9.56%) |  | 1.0 (0.7, 1.3) |
| *Lesbian* | 5 (6.25%) |  | 0.6 (0.3, 1.6) |  | 5 (3.82%) |  | 0.4 (0.2, 0.9)\* |
| *Heterosexual* | 477 (9.44%) |  | 1.00 |  | 507 (9.97%) |  | 1.00 |
| Syphilis (lifetime) |  |  |  |  |  |  |  |
| *Bisexual* | 7 (1.80%) |  | 3.7 (1.6, 8.6)\* |  | 5 (1.23%) |  | 2.6 (1.0, 6.9)\* |
| *Lesbian* | 2 (2.50%) |  | 5.2 (1.2, 22.1)\* |  | 0 (0.00%) |  | <0.001 (<0.001,>999.9) |
| *Heterosexual* | 25 (0.49%) |  | 1.00 |  | 24 (0.47%) |  | 1.00 |

\*P<.05 in logistic regression

Table 3 Distribution of Potential Risk Factors among US Women Aged 15-44 in 2011-2013 and 2013-2015 waves of the NSFG

   
\*If the participant is in a same-sex marriage or living with a same-sex partner, “Never been married” was selected.

# Discussion

Our findings generally suggest disparities STIs in the last 12 months, chlamydia rates, and syphilis rates among bisexual women when compared to heterosexual women. Bisexual women were almost 4 times as likely to report lifetime syphilis compared to their heterosexual counterparts. There is also a disparity regarding rates of gonorrhea and genital herpes, however this was only found to be statistically significant in the 2011-2013 wave. Although gay/lesbian women and bisexual women are both sexual minorities, the percentage of lesbians with STIs was almost always lower than both heterosexual women and bisexual women, while bisexual women tended to have the highest prevalence. The biggest exception to this trend was the 2011-2013 wave’s lifetime syphilis result. Lesbian participants were 5.2 times as likely to contract syphilis in their life time as heterosexual women. Of all of the statistically significant results, this finding had the largest OR of any STI outcome. Given the consistency and number of categories where an elevated OR is present, NSFG data shows STI disparities between bisexual and heterosexual women exist. Similar previous literature, the data from NSFG lesbian participants is less consistent. Previous studies have had differing conclusion on risk of STI acquisition among lesbian women compared to heterosexual. In this paper there was conflicting trends between waves. While the 2011-2013 wave has a strong association between lifetime syphilis and lesbian identity, it is not present in the 2013-2105 wave.

## Strengths

The overall NSFG is a relatively large national study that is representative of the United States general population of women aged 15-44. A strength of the study is the comprehensive measurement of high priority STIs for public health intervention including chlamydia, gonorrhea, and syphilis. Due to the size of the survey, multiple risk factors can be examined in addition and in relation to the primary STI outcomes. The sampling strategy is also a big strength of the study. Using a multi-stage stratified clustered sampling frame allowed for a nationally representative cohort. Additionally, since the NSFG is administered every two years, there is an opportunity to look at broadly observed changes over time at the population level. Although the population is not exactly the same wave to wave, it still represents a series of cross-sectional analyses.

## Limitations

One of the major limitations of this study is that the outcomes measured rely on participants self-report going to the doctor in the last 12 months and to get tested for STIs. Additionally, many STIs are asymptomatic. When an STI is symptomatic, one would be more likely to seek out medical care which could in turn result in STI diagnosis and treatment. However, when an STI is asymptomatic, those affected may not go to a healthcare provider, or if they do, may not choose to or be offered STI testing. Due to the asymptomatic nature of many STIs, it is likely the burden of disease amongst all groups is underestimated.

Research on prevalence and risk factors of STIs among lesbian women is not well-understood and has resulted in WSW not receiving STI screenings and potentially being undiagnosed. Although probable woman-to-woman STI transmission has been reported, true incidence of specific infections among lesbian women is unknown due to a variety of factors including discomfort of disclosing sexual identity, ignorance of lesbian sexual practices, and infrequent screening.5 For many WSW, there is a lack of knowledge and/or education about potential STI transmission between women.6 A study using focus groups among lesbian and bisexual women reported women frequently sharing sex toys without the use of condoms. Although they viewed using barrier methods (such as gloves or condoms) as acceptable, the women reported little use of preventative measures with female partners. In order to encourage use of prevention methods, safe-sex messages should emphasize the risk of STI transmission during WSW encounters.6

Even within the LGBTQ+ community, interventions targeted towards sexual minority are limited. A systematic review of sexual health interventions for adults in the United States looked at 12 articles relating to LGBTQ+ targeted interventions. Of the 12 interventions, 11 were targeted to MSM (men who have sex with men) exclusively and 1 was targeted to transgender individuals.16 An obvious lack of interventions targeted towards improving sexual health in sexual minority women means that misconceptions are not being addressed. Due to misconceptions surrounding woman-to-woman transmission, WSW may not request that their doctors give STI screenings.11 From a provider’s perspective, there is some disagreement among clinicians and public health workers over the assessment of disease transmission risk from WSW contact, which can result in reduced screening.

It is possible that current rates of STIs among WSW in this study and previous estimates are underreported due to misinformation regarding the risk of transmitting STI. Both bisexual and lesbian women in focus group discussions expressed the perception that providers lack knowledge of lesbians regarding STIs and sexual health, including STI risk reduction.15 They additionally expressed the perception that lesbians do not need to use condoms due to the lack of risk for either pregnancy or STIs.15 The perceived lack of risk for STIs could potentially result in underreporting due to self-perceived low risk of STI acquisition and therefore not getting tested frequently Receiving an official diagnosis from a healthcare provider requires women to utilize health care. Therefore, health care utilization may play a role in STI reporting. There has been some research into healthcare utilization amongst LGBTQ+ individuals and sexual minority women are more likely to report less access to and utilization of health care services, including cervical cancer screenings, compared to heterosexual women.13 Factors such as “outness” (if a person is open with their provider about their sexual identity) and stigma contribute to health care utilization. Among cisgender women, outness about one’s sexual identity is significantly associated with increased primary care utilization.14 The NSFG did not measure outness or perceived stigma, therefore we cannot determine how these factors may have played a role in health care utilization.

Aside from potential underreporting, there are obvious limitations when looking at the potential risk factors. Firstly, key risk factors are not measured, such as lifetime sexual partners and change of sexual partners. When measuring use of sexual barriers, such as male and female condoms, dental damns, or finger cots, the NSFG only asked if the respondent had ever had sex with a partner using a condom. While formal education on STI transmission is measured, there is no way of measuring the quality, or if any of it was tailored to WSW or WSMW individuals. Formal education tailored to WSW and/or WSMW individuals would go into depth on the STI transmission from woman to woman, how to practice safer sex with other women (e.g. dental dams, use of a latex glove or finger cots), and teaching women how to initiate conversations with their health providers about their sexual identity and STI testing. Another risk factor, marital status, only asks about opposite sex relationships. If the participant was in a same-sex marriage or living with a same-sex partner the answer selected from the survey would be “Never been married”. Because of this, there is no way to see if there is any protective benefit from being married in a same-sex marriage or living with a same-sex partner. In the future, response categories should be inclusive of same-sex relationships or expand to include a same-sex specific section.

Another important limitation is that although the overall sample size of the NSFG was large, the sample sizes of the lesbian and bisexual women were relatively small. Due to these small sample sizes, there was the potential for a large amount of variability between cohorts. For example, in the 2011-2013 wave, lesbians had the highest rate of syphilis (2.50%) and were 5.2 times as likely to have syphilis during their life time as their heterosexual counterparts. However, in the 2013-2015 wave there were 0 lesbian women with syphilis. There are several possible explanations for this change between waves. The change could be the result of a small sample size and by extension issues with the power of the data. This would result in unstable estimates and could contribute to the difference between years. Another possible explanation is that STIs were underreported in the 2013-2015 wave, however this is unlikely due to the change in insurance status. The amount of people who have been uninsured any time in the past 12 months has gone down among heterosexual women (28.27% to 25.45%), lesbian women (35.00% to 27.48%), and bisexual women (34.96% to 27.70%) since the 2011 to 2013 survey. With more women insured, they may have the resources for contraception and STI treatments, and this could be why STI prevalence among NSFG women have gone down.

## Future Implications

Based on the existing literature and the results of this essay, future research should focus on identifying probable transmission mechanisms, finding ways to encourage sexual minority women to get screened more often, and testing the efficacy of programs already in place. Health providers should be educated how to provide STI testing in ways that are not stigmatizing to sexual minority patients. There is a need and opportunity to develop and implement patient-provider communication research and trainings on service provision among sexual minority populations. Studies could focus on taking cultural competency and humility techniques used in other communities and adapting them to sexual minority trainings and to see which techniques are most effective at increasing communication, reducing stigma, and increasing health care utilization. On a smaller scale, there has been some success in improving patient-provider relationships when providers do not assume a cisgender or heterosexual identity, have a basic knowledge of legal and cultural issues facing LGBTQ+ individuals, and are aware of LGBTQ+ specific health concerns.14 Research is an important step to implementing interventions on a larger scale, once there is evidence of what techniques are most effective. Future studies may also find it beneficial to include more sexual minority identities (such as pansexual). The NSFG is moving towards being more inclusive. In their 2015-2107 survey, half of respondents were randomly assigned to the traditional sexual orientation question, while the other received a new format, which included lesbian or gay, straight, bisexual, and something else. While the survey will not capture specific identities, it is an important step to capturing the diversity of the sexual minority community. In order to capture all sexual minority identities a free response question or and “other” option with the chance to specify may be appropriate. Although transgender individuals are not all part of the sexual minority community, they are another underrepresented group. Transgender men’s sexual health has not been well studied and transgender women are disproportionately affected by HIV, an STI outcome which was not measured by the NSFG although they did measure testing rates.12 The NSFG did not measure transgender identity, so there is no way to tell how much of the sample is transgender, and how being in a gender minority and sexual minority may affect STI outcomes. Both sexual and gender identity questions should be added to more national surveys to ensure that health disparities experienced by sexual minority women and the LGBTQ+ community can be comprehensively measured and compared. As a result, targeted and evidenced based efforts can and should be developed to reduce disease transmission and progression, increase mental and physical health, and reduce health care costs in the understudied population of the LGBTQ+ community.

## Conclusions

While the power of the data may not be strong enough to draw definitive conclusions due to small sample size in the sexual minority women, there are statistically significant trends in the 2011-2013 wave indicating that bisexual women are at greater risk for developing a variety of STIs. Bisexual women are unique in that the experience stigma from both heterosexual and lesbian women for their identity.18 This unique layer of stigma may be affecting STI prevention and care so it is important to address bisexual specific microaggression in setting that can be controlled, such as health care settings. Despite the limitations of the study, the consistent disparity across waves for bisexual women in STI diagnoses in the past 12 months, chlamydia in the past 12 months, and lifetime syphilis highlights a need identify other existing STI disparities as well as why such disparities exist and how we can work towards reducing these disparities among sexual minority women.

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