Association Between Opening A Jail And Sexually Transmitted Infections In Rural Counties Across The United States

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Association Between Opening a Jail and Sexually Transmitted Infections in Rural Counties

Across the United States

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May 2020

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Abstract

Objective
To estimate the effect of openings jail in rural counties on county-level chlamydia, gonorrhea, and syphilis prevalence rates.

Methods
We used county-level data from the National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (2005-2017) to obtain chlamydia, gonorrhea, and syphilis rates, and the American Correctional Association’s National Jail and Adult Detention Directory (2013-2014) to locate rural jail openings. Using a generalized synthetic control method, we estimated the effect of opening jails in 41 rural counties between 2010 and 2012 across the United States on sexually-transmitted infections.

Results
We found an average treatment effect for chlamydia prevalence rates in the years following rural jail openings to be increased by 30.6% (p=0.019). For gonorrhea, this effect was 43.3% (p=0.0015). Our sensitivity analysis highlights that gonorrhea may also have spillover effects on nearby rural counties without jails (57.2%; p>0.001). Our results for syphilis rates were inconclusive as we found a significant effect in the years following rural jail openings 25.4%; p=0.036), but sensitivity analyses suggest that this association was driven by one county with high prevalence rate.

Conclusions
Opening a jail in rural counties is associated with increased rates of chlamydia and gonorrhea in the surrounding county in which it is sited.
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Introduction

Today, the U.S. houses more people within its criminal justice facilities compared to any other country around the world.1 More so, jails are the cornerstone of the American criminal justice system with 10.6 million jail admissions each year.1,2 Over any given day, around 615,000 individuals are held in local jails with the overwhelming majority not having been convicted of a criminal case but rather awaiting trial.1,2 From 1970 to 2017, U.S. jail capacity grew by 277%, given a range of state-sanctioned practices but particularly due to increased drug-related arrests.2,3 Recently, the biggest cities in the U.S. have lowered the number of people housed within jails by 18% as a result of concentrated efforts by political leadership to prioritize criminal justice reform.2,4

In spite of a trend toward decarceration in urban settings, rural counties are experiencing dramatic increases in jail populations.2,5 This rural jail boom has been driven by two factors: a large pretrial population and more people being held in local jails for other federal law enforcement agencies. In 2013, rural counties had the highest pretrial incarceration compared to non-rural counties at 265 per 100,000 individuals, which had increased 436% since 1970.2 Rural jails have also been increasingly housing individuals from other agencies, such as Immigration and Customs Enforcement (ICE), but this phenomenon varies substantially by geographic region.2,6 For example, rural Southern counties have the highest share of population held for other agencies at 57% compared to the next highest region at 41% for the West.2

Consequently, to support these massive demands, communities across the U.S., particularly rural ones, have been exposed a boom of siting new prisons and jails.6,7 In the 1990s alone, spending on criminal justice facilities, including the construction of new facilities, increased by 521%.8 This translated to a new prison building built in rural America every 15
days between 1990 - 1999. In many situations, especially among rural spaces, support behind new detention facilities comes from community members and politicians alike, who envision these as economic growth opportunities in mainly deprived parts of America. However, some studies have shown that prison construction has impeded economic growth among rural counties, especially those with lower level of education. A similar study established that such construction did not contribute to job growth, and in some cases, actually slowed down job growth. However, there is no evidence on how sitting of new detention facilities affect health outcomes in the surrounding community.

Nonetheless, jail openings could affect disease rates among the surrounding community, and in particular, sexual health risks in numerous ways. People with histories of incarceration have higher rates of STIs compared to the general population and their release to the community could contribute to the spread of these diseases. In a study of over 247,211 individuals in Indiana, those with incarceration histories were found to have a relative risk of 3.9 for chlamydia, 6.6 for gonorrhea, 4.6 for HIV, and 3.6 for syphilis compared to those without incarceration histories. A longitudinal study of individuals in a Virginia jail demonstrated high rates of condomless sex both prior to and after release from incarceration. Further, several ecological studies have also documented the relationship between incarceration and STIs. For example, in a longitudinal analysis of census tracts in Atlanta, Georgia, the authors concluded that those tracts with increasing male incarceration rates had the highest increase in new chlamydia, gonorrhea, and primary syphilis diagnoses.

In addition to jails housing and releasing individuals with higher STI transmission risk, building a jail requires extensive, specialized construction, which in rural counties could mean an influx of workers that may engage in riskier sexual behaviors—similar to what has been
documented for other industries requiring migrant workers. Particularly, past studies have documented trends among migrant workers having risky sexual behaviors, low condom use, and high STIs rates while working away from their homes in situations such as reconstruction efforts following Hurricane Katrina, shale gas activity in Ohio, and mining in South Africa. With rural jail construction, it may be that workers—mainly male—migrate to new counties for a short period of time with less social support and networks, limited family connections, and increased opportunities for new sexual relationships that may exacerbate STI transmission. Evidence from New York suggests that new construction of detention facilities often relies on non-local labor. Thus, county-level STI rates could increase through new sexual mixing patterns when a rural county opens a jail.

The effects of constructing new jail facilities on the surrounding community health remain unknown. To address this gap, we examine whether opening jails influence sexually-transmitted infections (STIs) prevalence rates in rural counties. In this study, we compared STI prevalence among rural counties before and after a jail opening compared to a synthetically generated control group that is a weighted combination of rural counties without jail openings. We hypothesized that opening a jail in rural counties would lead to a change in STI outcomes in the immediate year following the opening which would be sustained over following years.

Methods

Study Sample and Treatment Assignment

To identify county jail openings, we assembled a unique dataset with jail facility name, location, and opening dates across all 50 states and the District of Columbia using the American Correctional Association’s National Jail and Adult Detention Directory (2013-2014). The American Correctional Association (ACA) directory provides comprehensive information on the
locations and opening dates of jails nationally and has been used in prior studies examining the
effect of jails on community health.\textsuperscript{7,10} We excluded facilities owned or operated by the Bureau
of Prison and Immigration and Customs Enforcement in an effort to focus on local facilities.
Next, we identified all rural counties experiencing a jail opening and those without a jail or jail
openings between 2010 and 2012. To do so, we utilized the 2013 Rural-Urban Continuum Codes
(RUCC), designed by the Economic Research Service of the U.S. Department of Agriculture to
classify rurality. Counties with a four or higher on this rural-urban scale were categorized as
rural.

Rural counties that experienced at least one jail opening during 2010 and 2012 were
assigned to the treatment group. Given the availability of outcome data, we only included
counties that had jail openings from 2010-2012 in order to examine five years before and after
openings. The control group was composed of rural counties that neither had a jail nor
experienced a jail opening during this time frame. In order to account for geographical variation
and reduce sampling bias, we eliminated any states that did not have both a rural county with and
without a jail opening in this time frame. Alaska was also excluded from the sample because it
underwent major county redistricting during this timeframe, which limited our ability to trace
STI outcomes over time. The 21 states included in these analyses can be found in the
Supplement (\textit{Table 1}).

\textit{Outcomes}

We obtained county-level prevalence data per 100,000 persons on STIs from the National
Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention AtlasPlus database. Chlamydia,
gonorrhea, and primary and secondary syphilis data were obtained for the years 2005-2017. We
then plotted unadjusted trends of these sexual infections per 100,000 persons by event time since
jail opening (Figure 2). We assigned the median year of jail openings as the event year for those control counties not experiencing a jail opening.

**Covariates**

We included the following time-varying characteristics in our analyses, which have been documented to have a relationship with the STI outcomes of interest. Using the American Community Survey (ACS), we obtained five-year county estimates for the following characteristics: median age, percentage of non-Hispanic, White individuals, sex ratio of males per 100 females, percentage of individuals with high school degree or equivalency, unemployment rate, and median household income. We also retrieved the percentage of civilian, noninstitutionalized individuals lacking health insurance coverage on the county-level from the Census Bureau’s Small Area Health Insurance Estimates (SAHIE).

**Statistical Analysis**

First, we compared county-level demographic and socioeconomic characteristics for rural counties experiencing a jail opening from 2010 to 2012 and rural counties without a jail opening (Table 1). We conducted student’s t-tests for each baseline characteristics to detect any significant differences between rural counties with and without jail openings. We then measured STI trends over time from the opening of a rural jail using a generalized synthetic control (GSC) method to produce counterfactual estimates of what would have happened if a jail had never opened. Applying the GSC method, characteristics from the control units are utilized to generate a better estimate than the average of all control units for the treated units. Specifically, a weighted combination of potential control units from a donor pool is prioritized to create counterfactuals that best explain the outcome variables. In this study, the donor pool consisted of those rural counties in the control with no jail nor jail openings during this time frame. Each
treated unit thus had a synthetic control that was weighted combination from the donor pool of rural counties without jail openings. The synthetic control approach has been well-established in various studies to investigate the effects of health and social interventions, from state-level tobacco control program to hospital-level pay-for-performance incentives.\textsuperscript{21,22} The GSC approach had several advantages, including: 1) it relaxes the parallel trends assumptions, 2) it can be applied to smaller sample sizes as well as multiple treated units over many time periods, and 3) it can produce robust uncertainty estimates.\textsuperscript{20} We included median age, percentage non-Hispanic, White adults, percentage without health insurance, household median income, and male-to-female ratio as covariates given their association with the STI outcomes of interest.

After generating the synthetic controls, we estimated the average treatment effect on the treated (ATT) by taking the difference between the mean outcomes in rural counties with jail openings and the synthetic control units (\textbf{Table 2, Figure 2}). Further, we used county-fixed effects to make additional adjustments for unobserved, time-invariant confounders that may influence any associations between the exposure and outcomes in generating the synthetic controls. We utilized bootstrapping to obtain standard error and confidence intervals surrounding the ATT estimates. Lastly, we used a cross-validation process to select the GSC model that would minimize the root mean squared prediction error (RMSPE), a measure of the goodness of fit between the generated synthetic control and treated units.\textsuperscript{20} All models were included if they produced a RMSPE of less than three. This cut-off has been noted elsewhere as indicating a good fit between the treated units and the synthetic controls.\textsuperscript{23}

\textit{Sensitivity Analysis}

We conducted several tests to check the robustness of our results. First, one concern is that a few control units from the donor pool may be disproportionally impacting the generation
of the synthetic control. To address this concern, we eliminated the top 10% of heavily weighted control units from the donor pool. On the other hand, it could be feasible that a few treated units are driving the association between a jail opening and STI outcomes. To account for this, we successively eliminated the five counties with the highest prevalence rates in the years following jail openings for each STI from the treatment group. If one of these counties were influencing the association, we would expect the results to be partially attenuated. The third sensitivity analysis created an alternate control group to address any spillover effects from opening a jail. Specifically, we eliminated adjacent rural counties from the control group and generated the synthetic controls only from non-adjacent rural counties without jail openings. Lastly, in order to test whether opening a jail in one rural county has spillover effects on nearby rural counties, we reassigned the treatment group as rural counties adjacent to ones that had opened a jail. If there were any spill-over effects on STI outcomes in adjacent counties, then any significant relationship between opening a jail and STI outcomes would also be observed in that adjacent county as well.

All statistical analyses were conducting using R version 3.5.1 (R Foundation for Statistical Computing, Vienna, Austria). As consistent with Yale University Institutional Review Board’s policy, this study did not require review given its use of deidentified data.

**Results**

Between 2010 and 2012, we identified 41 rural counties with jail openings across 21 states to include in our analysis (**Supplement, Table 1**). Baseline demographic and socioeconomic characteristics were similar between the 41 rural counties with jail openings and the 294 rural counties without jails or jail openings (**Table 1**). Median age was the only variable significantly different between the two groups, with rural counties not experiencing jail openings
have a higher median age compared to those with openings (p>0.001). Figure 2 shows the unadjusted trends of chlamydia, gonorrhea, syphilis five years before and after jail openings. In the years prior to jail openings, treated counties had higher mean prevalence than untreated counties, with the exception of a few years for syphilis. Following the jail openings, counties in the treated group experienced a greater increase in STI mean prevalence than those not in the treated group. The prevalence for chlamydia and gonorrhea reached the highest four years after jail openings, and the syphilis prevalence was highest five years after the jail openings.

Main Analysis

Notably, we found significant average treatment effect on the treated in the years following jail openings in this sample of rural counties on our STI outcomes of interest (Table 2). Across all years following the jail openings, the ATT for chlamydia was 30.6% (p=0.019). This effect was even larger (42.5%) at year five following jail openings among this group of rural counties (p=0.016). For gonorrhea, the ATT effect across all time periods was 43.3% (p=0.015) and notably higher at year five after the jail openings (97.8%; p=0.002). While the effect for syphilis did not reach significant in any particular year following jail openings, the average treatment effect combined across all years (25.4%) following the jail openings suggests a significant effect (p=0.036). Figure 2 demonstrates the ATT by year for these STI outcomes.

Sensitivity Analyses

Our findings for these STI outcomes did not change when we restricted our control group to exclude the top 10% of weighted counties nor when we used an alternate control group that eliminated counties that were adjacent to treated counties that opened a jail (Supplement, Table 2). When we assigned treatment to adjacent counties to test for any spillover effects, we found a significant association between rural jail openings and gonorrhea prevalence rates (Supplement,
Table 2). This finding suggests that the association may extend beyond just the county that opens the jail into nearby rural counties without jail openings as well. When we successively eliminated the top five counties with highest prevalence rate in the years following jail openings, the association did not change for chlamydia and gonorrhea (Supplement, Table 3). However, the association between rural jail openings and syphilis was attenuated when we eliminated several of the top five counties with highest syphilis rates in the years following openings (Supplement, Table 3). This finding suggests that the association between rural jail openings and syphilis rates may be driven by an outlier with the highest prevalence rates.

Discussion

To the best of our knowledge, this is the first quasi-experimental study to examine the association of rural jail openings on STI outcomes in rural counties across the United States. We showed rates of chlamydia and gonorrhea had increased, respectively, by 42.5% (p=0.016) and 97.8% (p=0.002) five years after jail openings in 41 rural counties that had jail openings between 2010 and 2012 relative to the synthetically generated control group. These rates are as high as 334 cases per 100,00 persons and 70 cases per 100,000 persons for chlamydia and gonorrhea, respectively. Further, for gonorrhea, our sensitivity analyses suggest there may be a spillover effect such that rural jail openings may also increase gonorrhea rates (57.2%) in adjacent rural counties without jail openings as well (p >0.001). We found inconclusive results for the effect of rural jail openings on syphilis rates. In our main analysis, the ATT for syphilis (25.4%) across all five years following jail openings was significant (p=0.036). However, our sensitivity analyses suggest one county with the highest prevalence rate was largely driving this significant finding as the association (19.8%) was fully attenuated once removing that county from the analysis (p=0.152).
These findings support those of other ecological studies focused on incarceration and STIs. Thomas et al. reported that a percentage increase of 0.5% in census tract person-time incarcerated was associated with a 7.1 case per 100,000 person-years gonorrhea rate increase. Finally, Nowotny et al. recently concluded that county-level jail incarceration rates across U.S. were associated with rate increases of 10.13 per 100,000 and 2.47 per 100,000, respectively, for chlamydia and gonorrhea. While our effects at year five (42.5% and 97.8%, respectively, for chlamydia and gonorrhea) were large, such findings make sense given that opening a local jail could enable county-level incarceration rates to substantially increase.

While not focused on the criminal justice system, Deziel et al. found that counties in Ohio with high shale gas activity had 21% increased rates of chlamydia and 19% increased rates of gonorrhea compared to counties with no shale gas activity. The authors propose new sexual mixing patterns, specifically from migrant shale gas workers, as a plausible mechanism by which community-level STIs increase. Notably, in our study however, the effect of opening rural jails on these STI outcomes was not associated with immediate changes in the years of openings or in the immediate years following the openings. Rather, we found increased rates after the jails had been opened for a few years that continued to increase in later years. This finding suggests that the construction of such jails and the specialized labor force that may come with such construction did not likely contribute to increased community STI rates. The construction and openings of new detention facilities thus may not operate similar to other industries, such as shale gas activity and mining, in regard to migrant workers influencing sexual risk and STI rates.

Rather, opening rural jails may facilitate a new population of people who are more likelihood to have and transmit STIs. Such shifting social dynamics and changing sexual
mixing patterns could occur in several ways. First, rural counties with new jails now have the ability to incarcerate individuals within their own jurisdictions, instead of previously used alternatives, such as sending individuals to jails in other counties. While incarcerated, individuals could contract STIs that they then transmit within the local community once released. Given the high rates of jail churns, such transmission dynamics could lead to substantial changes in community STI rates.\(^1\,\,!\,\,!\,\,!\,\,!\,\,!\,\,!\,\,2\) Secondly, if rural counties with new jails are now housing individuals from other—mainly rural—counties without local jails, this spread could be even geographically further as individuals could return to their home county following release. Our findings that suggest opening rural jails could have spillover effects in regard to gonorrhea could be evidence of this phenomenon.

**Limitations**

This study has several limitations. First, STI screening, particularly among young adults, have been widely variable and remain low.\(^24\) Counties with poor screening rates thus may have deceptively lower disease rates, while counties that report dramatic increases may be reflecting a change in screening practices, not a true disease incidence increase. While we attempted to control for this effect by including county-level health uninsurance rates in this analysis, we could not fully capture the differential screening rates that may occur across counties. Next, while we only examined jails here, there are numerous other criminal justice facilities that could influence STI outcomes, including federal prisons and ICE facilities. Further, given the difficulty in knowing the exact locations of such facilities, it is possible some of these non-jail detention facilities were located in the counties analyzed here, which could have introduced unaccounted bias. Such facilities could have been either in our control or treatment groups, which would have biased our findings either towards or away from the null, respectively. Similarly, all jails opened
during this time frame were not necessarily similar in nature and may have vary by a number of characteristics, including size and capacity.

Thirdly, given data availability, we were unable to examine disease outcomes stratified by gender, which could be important for several reasons. First, males and females experience both chlamydia and gonorrhea differently. For example, up to 80% and 50% of cases, respectively for chlamydia and gonorrhea, are asymptomatic in females.\textsuperscript{25,26} Secondly, while males have typically been incarcerated at disproportionate rates, female incarceration in rural counties has been dramatically increasing in recent years.\textsuperscript{2} Lastly, this study was unable to elucidate mechanisms behind its results nor could it shed light on moderating factors behind the associations. While shifting community dynamics are likely important in understanding how criminal justice facilities influence STI rates, other factors such as type and size of facilities, and economic and employment opportunities could also influence this relationship.

**Public Health Implications**

Chlamydia and gonorrhea both present major burdens to our healthcare system, in terms of prevalence as well as costs.\textsuperscript{27–29} Further, amidst threats of antibiotic resistance, this study highlights the carceral system as a facilitator of poor STI disease outcomes and suggest several points of interventions.\textsuperscript{30} First, jails can act as sites of STI prevention with readily available and easily accessible prevention methods, such as condoms. Further, testing and treatment of such STIs while individuals are housed within jails could limit further spread into surrounding communities. Thirdly, state laws, such as those permitting expedited partner therapy, allowing minors to consent to STI services, and protecting confidentiality for young adults on parent’s health insurance plans, could eliminate barriers to STI screening and treatment in the community. Fourth, Medicaid expansion and broaden insurance coverage of STI services could
ensure more low-income individuals, which is typically a population disproportionately impacted by incarceration, have access to STI screening and treatment. Lastly, any efforts to avoid new construction of correctional facilities and decarcerate could be effective population-level STI disease prevention and management.

Our findings add to the body of literature that suggests incarceration not only directly affects those within its facilities but also the surrounding community through worsen STI outcomes. These results are particularly important as rural counties continue to experience increased incarceration rates and demand for detention facilities. Future studies could build upon this work by understanding the mechanisms between such associations, exploring other health outcomes that may be impacted by opening detention facilities, and examining more hyperlocal effects, such as on the census tracts level, of such openings.
### Table 1. Baseline County-Level Demographic and Socioeconomic Characteristics of Rural Counties By Jail Opening Status

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Jail Opening (n=41)</th>
<th>No Jail or Jail Opening (n=294)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (median), years</td>
<td>40.3 (3.8)</td>
<td>42.8 (5.1)</td>
<td>&gt;0.001</td>
</tr>
<tr>
<td>Non-Hispanic, White adults, %</td>
<td>86.4 (38.4)</td>
<td>80.8 (33.1)</td>
<td>0.375</td>
</tr>
<tr>
<td>Male-to-female ratio, number of males per 100 females</td>
<td>99.9 (7.9)</td>
<td>102.5 (14.6)</td>
<td>0.091</td>
</tr>
<tr>
<td>Adults with high school degree or higher, %</td>
<td>82.4 (8.0)</td>
<td>81.8 (8.3)</td>
<td>0.669</td>
</tr>
<tr>
<td>Adults who reported being unemployed in past year, %</td>
<td>7.4 (3.3)</td>
<td>6.2 (4.7)</td>
<td>0.052</td>
</tr>
<tr>
<td>Household income (median), US dollars</td>
<td>$40,433.6 ($7,886.8)</td>
<td>$39,811.0 ($8,462.1)</td>
<td>0.641</td>
</tr>
<tr>
<td>Adults without health insurance, %</td>
<td>19.3 (5.2)</td>
<td>19.9 (5.8)</td>
<td>0.497</td>
</tr>
</tbody>
</table>

1. Sample included rural counties with jail openings from 2010 to 2012. All data represent county-level five-year estimates from 2010, the first year of jail openings in this sample of rural counties.
Table 2. Effects of Jail Openings on STI Outcomes in Rural Counties Compared to Synthetic Controls

<table>
<thead>
<tr>
<th></th>
<th>ATT Across Years Post-Opening</th>
<th>p-value</th>
<th>ATT at Year 5 After Opening</th>
<th>p-value</th>
<th>RMSPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia(^2)</td>
<td>30.6%</td>
<td>0.019</td>
<td>42.5%</td>
<td>0.016</td>
<td>1.6</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>43.3%</td>
<td>0.015</td>
<td>97.8%</td>
<td>0.002</td>
<td>2.0</td>
</tr>
<tr>
<td>Syphilis</td>
<td>25.4%</td>
<td>0.036</td>
<td>47.9%</td>
<td>0.080</td>
<td>0.7</td>
</tr>
</tbody>
</table>

1. The root mean square prediction error (RMSPE) measures the goodness of fit between the synthetic control and treated units. A RMSPE of three was used to indicate a well-fitted model.

2. Chlamydia and gonorrhea had 41 counties that had jail openings in the exposure group. Given insufficient data for some counties, syphilis outcomes were measured among 38 counties with jail openings.

Figure 1. Unadjusted STI Outcomes in Counties by Jail Opening Status

Unadjusted mean STI prevalence per 100,000 persons for rural counties experiencing a jail opening between 2010 and 2012 (n=41) and rural counties not experiencing a jail opening nor having a jail (n=294) five year before and after jail openings. Three counties with jail openings did not have sufficient syphilis data to map across all years and were excluded.
Figure 2. Average Treatment Effect on Treated Across Time Periods

The average treatment effect (%) of opening a jail among rural counties (n=41 for chlamydia and gonorrhea; n=38 for syphilis) in the years prior to and following a jail opening, compared to synthetic controls generated using a GSC estimation model. We utilized bootstrapping to estimate 95% confidence intervals.
References


Supplementary Material

<table>
<thead>
<tr>
<th>State (n=21)</th>
<th>Number of Rural Counties without Jail Opening Between 2010 and 2012 (n=294)</th>
<th>Number of Rural Counties with Jail Opening Between 2010 and 2012 (n=41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>4</td>
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<tr>
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<tr>
<td>Virginia</td>
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</tbody>
</table>

1. This group of counties comprised our donor pool from which we generated synthetic controls to compared against rural counties with jail openings.
Table 2. Sensitivity Analyses with Adjusted Control Groups and Treatment Assignment

<table>
<thead>
<tr>
<th></th>
<th>Baseline$^1$</th>
<th>Restricted Control Group$^2$</th>
<th>Alternate Control Group$^3$</th>
<th>Placebo Treatment Assignment$^4$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATT$^5$</td>
<td>p-value</td>
<td>ATT</td>
<td>p-value</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>30.6%</td>
<td>0.019</td>
<td>30.8%</td>
<td>0.012</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>43.2%</td>
<td>0.015</td>
<td>43.1%</td>
<td>0.012</td>
</tr>
<tr>
<td>Syphilis</td>
<td>25.4%</td>
<td>0.036</td>
<td>30.5%</td>
<td>0.022</td>
</tr>
</tbody>
</table>

$^1$ Baseline model composed of 41 rural counties for estimates on chlamydia and gonorrhea and 38 rural counties for syphilis.

$^2$ Restricted control group composed of 41 rural counties for estimates on chlamydia and gonorrhea and 38 rural counties for syphilis.

$^3$ Alternate control group composed of 41 rural counties for estimates on chlamydia and gonorrhea and 38 rural counties for syphilis.

$^4$ Alternate control group composed of 39 rural counties for estimates on chlamydia and gonorrhea and 36 rural counties for syphilis.

$^5$ All ATT estimates represent the average treatment effect across all years following jail openings.
Table 3. Sensitivity Analyses Removing Counties with Highest Prevalence Rate from Treatment Group\(^1\)

<table>
<thead>
<tr>
<th>Removed County with Highest Prevalence Rate</th>
<th>Removed County with 2(^{nd}) Highest Prevalence Rate</th>
<th>Removed County with 3(^{rd}) Highest Prevalence Rate</th>
<th>Removed County with 4(^{th}) Highest Prevalence Rate</th>
<th>Removed County with 5(^{th}) Highest Prevalence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATT(^2)</td>
<td>p-value</td>
<td>ATT</td>
<td>p-value</td>
<td>ATT</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>32.2%</td>
<td>0.010</td>
<td>33.8%</td>
<td>0.007</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>44.1%</td>
<td>0.013</td>
<td>42.3%</td>
<td>0.023</td>
</tr>
<tr>
<td>Syphilis</td>
<td>19.8%</td>
<td>0.152</td>
<td>26.1%</td>
<td>0.039</td>
</tr>
</tbody>
</table>

\(^1\) All models utilized 40 rural counties for estimating chlamydia and gonorrhea outcomes, and 37 rural counties for estimating syphilis outcomes.

\(^2\) All ATT estimates represent the average treatment effect across all years following jail openings.