High Rates of Incarceration as a Social Force Associated with Community Rates of Sexually Transmitted Infection

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**Background.** The United States has the highest rate of incarceration in the world. Some populations experience both high rates of incarceration and high rates of sexually transmitted infections (STIs).

**Methods.** To estimate the strength of this correlation, we calculated age-adjusted Pearson correlation coefficients between rates of incarceration and of reportable STIs in the 100 counties of North Carolina in 1999.

**Results.** Moderately strong correlations were found for chlamydia \( r = 0.577 \) and gonorrhea \( r = 0.521 \). The correlations between rates of incarceration and reported cases of acquired immunodeficiency syndrome and syphilis were weak \( r = 0.205 \) and \( 0.004 \), respectively.

**Conclusions.** Hypothetical causes of the stronger associations included incarceration increasing the number of infected prisoners or the infectiousness of released prisoners; an imbalance in the community sex ratio; and the negative influences of high rates of incarceration on social disorganization and collective efficacy. The magnitude of incarceration as a major force in American society, its association with some STIs, and our lack of empirical data on the potential causal connections argue for a new direction in STI research.

Patterns of disease in a population indicate the forces shaping the society in which they occur. The current American epidemic of obesity, for example, indicates a society that has progressively eliminated the need and opportunities for exercise. Most American cities and suburbs are structured for automobiles, rather than for pedestrians or cyclists [1]. Thomas and Thomas [2] showed how national agricultural policies, segregation, mass migration from the rural South to the industrial North, and the influx of cocaine into rural communities were twentieth-century social forces that led to high rates of syphilis in rural communities of North Carolina in the early 1990s.

Another of the prominent social forces in present-day America is incarceration. The state and federal prison population in the United States in 1998 was 1,302,019, which is larger than the population of 13 US states and all but 5 major cities [3]. This number represents a 3-fold increase since 1980. The increase is a result of more people being incarcerated, for longer periods of time, mostly as part of the country’s “war on drugs” [3]. Our national rate of new incarcerations per year is now the highest in the world, having recently surpassed that of Russia. The average duration of time served increased markedly in the late 1980s, after passage of the Sentencing Reform Act of 1984, which lessened the chances of early parole.

Men are incarcerated at a rate that is \( \sim 10 \) times that among women, and African American individuals are incarcerated at a rate that is \( \sim 6 \) times that among white individuals. Thus, the rate is highest among African American men. More than 1 in 4 African American men are incarcerated during their lifetime. On any given day, nearly 1 in 3 (32.2%) African American men aged 20–29 years is either in prison or jail or on probation or parole [3].

Rates of sexually transmitted infections (STIs) also are highest among African American men. The national rates of syphilis and gonorrhea among African American men in 1999 were 30 and 47 times, respectively, the rates among white men [4]. Gonorrhea and syphilis also enhance the transmissibility of HIV, contributing to racial disparities in rates of HIV infection and AIDS [5, 6].
We sought to better understand the relationship between incarceration and rates of STIs at the community level in North Carolina. In addition to the occurrence of STIs among future, present, and former prisoners, we were interested in incarceration rates as a social force affecting whole communities (i.e., those who never see the inside of a prison) and the association with community rates of STIs. A statistical association may reflect unintended negative consequences of concentrated incarceration on communities via changes in demographic characteristics, social and sexual networks, and other community dynamics. If such effects are substantiated through additional research, public health interventions that lessen the health effects of concentrated incarceration on communities may be needed.

METHODS

North Carolina counties (N = 100) were chosen as the unit of analysis for the study, for several reasons: (1) counties in North Carolina are relatively small and, in general, contain only 1 major town, if any, and we felt that this would be a reasonable approximation for a community; (2) the counties represent a variety of environments, from urban to semiurban to rural; and (3) data were available from all sources at the county level. Data on incarcerated individuals were limited to those in the North Carolina state prison system, thus excluding incarcerated individuals in jail, federal prison, and juvenile detention. Jail terms were excluded because they are relatively brief, and, thus, the effect on the unincarcerated people remaining in the community is likely to be less than that of longer prison terms. People are held in jails while awaiting trial or serving time for a minor offense. People in prison are serving time for a state or federal offense. Moreover, prison terms are usually preceded by time in jail; thus, including jail terms in the analysis would have double counted many of those incarcerated.

Federal incarcerations are approximately one-tenth the number of state incarcerations and, thus, would have a much smaller effect on communities, compared with state incarcerations [7]. Juvenile incarcerations are even fewer, constituting <1% of all incarcerations [8].

Data on admissions to the North Carolina state prison system during 1999, by county, were obtained from the North Carolina Department of Corrections (Raleigh). The data set included information on inmate race, sex, and age; date of birth; most serious offense; sentence; date of admission; and date of release. Each person appeared only once in the data set; repeat incarcerations were excluded.

Data on STI cases in 1999, by county, were obtained from the North Carolina Department of Health and Human Services (Raleigh). The STIs were gonorrhea, chlamydial infection, AIDS, and syphilis (primary and secondary). The data sets included information on patient race, ethnicity, sex, age, and county of residence; date of onset of infection; and disease diagnosis code.

RESULTS

There were 25,180 state-level incarcerations in North Carolina in 1999; 11% of these individuals were women. A higher rate of incarceration for a given county was associated with a higher rate of gonorrhea (r = 0.521; P < .001; figure 1), chlamydial infection (r = 0.577; P < .001), and AIDS (r = 0.205; P < .05). Incarceration was not correlated with the rate of syphilis (r = 0.004; P = .97).

Relatively few of the reported STI cases occurred among prisoners. Data on the source of reports for gonorrhea, chlamydia, and syphilis were unavailable for 1999, the year of this analysis; in 2000, however, <0.5% of cases of gonorrhea and chlamydia were reported from correctional facilities (jails or prisons) in North Carolina (Del Williams, Epidemiology and Special Studies Unit, HIV/STD Prevention and Care Branch, North Carolina Division of Public Health [personal communication]). Approximately 5% of primary and secondary syphilis cases (in 2000) and ~13% of AIDS cases (in 1999) were reported from correctional facilities.

DISCUSSION

The strength of the correlations between rate of incarceration and age-adjusted rates of gonorrhea and chlamydial infection in North Carolina can be categorized as “moderately strong” [9, p. 178]. The correlations between rate of incarceration and age-adjusted rates of AIDS and syphilis, however, were relatively weak. The methods of analysis we used were not robust to outliers. Compared with gonorrhea and chlamydia, AIDS and syphilis cases were relatively rare (many counties reported 0 cases in 1999); thus, these data were more vulnerable to outliers, and the correlations with rate of incarceration were more difficult to interpret.

Correlation coefficients were relatively robust in the presence of nondifferential misclassification (e.g., underreporting of STI cases that did not vary by county). Both chlamydial infection and gonorrhea are known to be commonly underreported. For
example, chlamydial infection is found usually through the screening of women, but since men do not routinely undergo screening, cases of infection in men are underreported [10]. However, our analysis relied on the relative (not actual) magnitude of the rates of infection. If the rate of chlamydial infection among men was underreported by the same proportion in each county, the correlation coefficients would be unaffected. Moreover, Thomas and Gaffield [11] found that, in a sensitivity analysis of underreporting, county-level associations between rates of gonorrhea and a variety of independent variables, as assessed by multivariable logistic regression, were not markedly affected by adjustment for differences in reporting by rural versus urban counties or for the presence of a health department.

Our analysis provides a tantalizing glimpse of an association between high rates of incarceration and high rates of STIs, particularly gonorrhea and chlamydia. However, this first glimpse raises many new questions that this study cannot answer. Are incarceration and STIs each an outcome of drug use but, otherwise, not causally linked to each other? What is the role of poverty in the relationship? To what degree is poverty an underlying cause of incarceration or a result of incarceration? Answering these questions will require data sets different from ours and a variety of study designs. However, in the following discussion, we consider a number of scenarios by which rates of incarceration might feasibly affect communities and translate into increased rates of STIs.

**A counterintuitive association?** If STIs are most often experienced by low-income minority populations, isolation of these populations by imprisonment would be expected to result in a lower rate of infection in the community. This intuitive relationship between incarceration and infections in the community is consistent with the nationwide decrease in rates of gonorrhea and syphilis that coincided with the increase in rates of incarceration in the 1990s. Yet, our analysis showed that rates of gonorrhea were higher in counties with a high rate of incarceration. How can this be?

A similar paradox has been observed in the relation between rates of incarceration and crime. In recent years, crime rates also have decreased in the presence of more-frequent incarceration and burgeoning prison populations. Yet, Clear et al. [12] found that the beneficial effect of incarceration on neighborhood crime disappeared beyond a certain level of incarceration. In Tallahassee, Florida, they found that rates of incarceration of \(\sim 0.0–1.0 \text{ admissions/100 population in 1996} \) were inversely related to crime rates in 1997. However, additional admissions lessened the beneficial effect on crime. An admission rate of \(\geq 1.6/100 \text{ population in 1996} \) was associated with an increased crime rate in 1997. (The mean admission rate for the 42 neighborhoods with at least 1 admission was 0.31.) Thus, for this city, Clear et al. [12] demonstrated a tipping point from the beneficial effects to the unintended negative consequences of incarceration.

The effect of incarceration on crime is not uniformly beneficial; more incarceration is not necessarily better. In a similar way, the effects of incarceration on community rates of STIs may be mixed. Although rates of gonorrhea have decreased as rates of incarceration have increased nationwide, rates of gonorrhea would possibly be even lower if not for the effects of high rates of incarceration in some populations.

There are 2 general means by which high rates of incarceration could influence community rates of STIs: the effects that released prisoners have on communities and the effects on the community of the absence of its members because of imprisonment. These
effects have not been studied in relation to STIs, but we present information that bears on these hypothetical relationships.

Potential effects of ex-offenders on communities. A disproportionate number of people with HIV infection spend time in correctional facilities. In 1997 in the United States, ~3% of the population served time in prison or jail. In contrast, one study estimated that 20%–26% of all people with HIV infection had spent time in prison or jail during the same year [13]. Because of the common role of incarceration in the lives of people with HIV infection and other STIs, there are frequent calls in the scientific literature for STI interventions in prisons and jails [14–18]. One researcher has noted that incarceration facilities thus afford a strategic opportunity to identify and treat infections [13]. However, what effect does this concentration of infected people in incarceration facilities have on the non-incarcerated community? As noted above, the removal of infectious individuals from the community might be expected to lessen transmission in the community. The opposite would be true, however, if incarceration either multiplies the number of infectious people who are released into the community or causes those who were already infected to be more infectious.

Infections could multiply if transmission in prison or jail exceeds the rate of cure for curable STIs. For an incurable infection such as HIV infection, essentially any transmission would increase the number of individuals who are infectious. Furthermore, for incarceration to increase the number of infections in the community, the rate of transmission during incarceration would need to be greater than the rate in the community. Sex is widely known to occur in prisons and jails [19, 20], but reliable estimates of the frequency of sexual transmission of infection among inmates are not available, to our knowledge.

An infected inmate could become more infectious if he or she acquires a coinfection (e.g., coinfection with gonorrhea causes HIV to be more transmissible [5]) or if the experience of incarceration leads to sexual behaviors, when released, that facilitate transmission. In a study of HIV-infected people released from a North Carolina prison, the mean time until sex after their release was 6 days. Although all these individuals said that they had told their main partner of their infection, only two-thirds had told their other sex partners. Thirty percent believed transmission of infection to their main sex partner was “very likely” or “somewhat likely” [21]. The researchers did not study whether the rates of these behaviors and beliefs were greater than those among HIV-infected people who were not just released from prison. One can speculate, however, that incarceration would heighten the desire for sex when released from prison. If the ex-offender is not released with an infection, he or she could facilitate transmission in the community by being more likely than before to select sex partners with infection. The effect of incarceration on sexual behaviors is another topic in need of study.

Absence of community members, owing to incarceration. Underscoring that the effect of concentrated incarceration on a community may be experienced mostly by those who are not incarcerated, only a small percentage of reported STI cases were from correctional facilities. By what mechanisms might rates of incarceration affect those who remain in the community?

A large majority of prisoners are men. Their absence from the community lowers the ratio of men to women. A lower sex ratio has been shown to be associated with higher rates of teen pregnancy [22], syphilis [23], and gonorrhea [11]. These are community-level associations that may result, in part, from some individual-level phenomena. When men are rare, they may have more power in relationships. Thus, for example, if a woman insists that her male sex partner use a condom but the man does not want to, he could threaten to leave her for another who will not insist on the use of condoms. A woman also may turn a blind eye to her partner’s affairs if she fears that confronting him about them may cause him to leave her.

The effect of a low sex ratio also may be evident in high proportions of female-headed households. One of the most consistent predictors of high rates of STIs in county-level studies is the proportion of female-headed households [11, 23]. Whether the STI cases are occurring among those in the female-headed households is not known, but the absence of fathers from households has been associated with higher rates of infection in the community. When an inmate is a man who lived with a female partner and the couple had children, incarceration created a female-headed household. Among men in state and federal prisons, 55% and 63%, respectively, have children [3].

Combined effects of incarceration and release. Social disorganization theory offers a perspective on the combined effects of the absence of people owing to incarceration and the release of ex-offenders into the community. According to this theory, socially disorganized groups are unable to “self-regulate”—that is, they cannot agree on and enforce a code of norms and values—owing to the damaging effects of problems such as unemployment, family disorganization, and poverty [24–32]. A key factor that destabilizes community life is residential mobility (i.e., people moving from one neighborhood to another). Areas with unusually high rates of residential mobility are thought to experience more social disorganization, because they have a higher proportion of residents who are not integrated into the community and who are in transition. Thus, the lack of integration (and the anonymity that accompanies it) leads to an environment in which shared norms and values are neither developed nor enforced, including norms that might regulate behaviors related to crime and sexual relationships.

Although mobility is generally defined as voluntary movement from one place to another, coercive relocation (as with imprisonment) is another form of mobility that can introduce social disorganization. Ex-offenders need to be reintegrated into
a community, whether they return to their home neighborhoods or go somewhere new. Thus, the reintroduction of former prisoners can affect the social life of a community, as did their absence while in prison [33].

Social disorganization also can reduce a community’s ability to work together toward a common goal—that is, it may reduce a community’s collective efficacy. Sampson et al. [34] demonstrated an inverse relationship between collective efficacy and neighborhood crime rates. A neighborhood with collective efficacy regarding treatment services for STIs might lobby for more accessible hours of services or more culturally acceptable services. When treatment services are inaccessible or culturally insensitive, people with infection are more likely to avoid or otherwise experience a delay in treatment [35, 36]. A longer duration of infection increases the likelihood of transmission to others, regardless of whether they have had anything to do with prison.

Beyond the need to investigate incarceration as a social force is the need in public health to enhance our awareness of social forces in general. Too often, STIs are regarded solely as functions of microbes, human physiology, and the behaviors of those who become infected. These are factors of the agent and host—2 corners of the traditional epidemiological triangle. The third corner, the environment, remains relatively unexplored. This is particularly true for aspects of the social environment that affect large populations, what we have referred to here as social forces. Neglect of environmental factors stems, perhaps, from a defeatism that assumes that social forces are beyond our control or from traditions in STI control that are rooted in laboratories and clinics. However, social forces do bow, on occasion, to changes in popular opinion, and those opinions can be shaped, in turn, by revelations of the effects of those forces. Consider, for example, changes in American social attitudes toward smoking.

Short of major changes in the tides of human society, it is important to understand social forces so that we may soften their effects or take them into account when evaluating interventions. The effects of incarceration on STIs may be softened, for example, with programs that follow-up ex-offenders with screening, treatment services, and education about avoiding infection or transmission [37, 38]. Programs that do not involve STI treatment, such as an alternative sentencing program that allows a person to remain under surveillance at home or a program that helps ex-offenders become reintegrated into the community, might also have a beneficial effect [39–41].

Social forces are important potential confounding variables in community-level studies, if their impact varies by community. For example, in a community-level intervention promoting condoms, delayed onset of sexual activity, or sexual monogamy, it would be important to understand the forces working against those behaviors and the level of intensity of those forces in the intervention and control communities. Other social forces relevant to STIs that should be explored include factors affecting the status of women in society and major disruptions to population or community composition, such as war and economic factors that lead to migration for jobs.

Conclusions. We have presented several scenarios by which rates of incarceration and STIs may be causally related. Although the scenarios we described are mostly hypothetical, the indisputable facts are that incarceration is a substantial social force, with rates in the United States having climbed sharply in recent decades to a dramatically high level; incarceration of adult men is 6 times more likely among black individuals than among white individuals; and many rates of STIs also are an order of magnitude higher among black individuals than among white individuals. There are feasible scenarios by which these disparities may be causally connected that deserve further scrutiny. Explanation of any mechanisms will benefit from both quantitative and qualitative (e.g., ethnographic) research methods. Future studies might examine sexual behaviors among individuals with a former sex partner who is incarcerated; how sexual partnerships after prison are affected by having been in prison; neighborhood efficacy in bringing STI treatment resources to a community; and an individual’s ability to contribute to neighborhood efficacy after being released from prison.

References