The Burden of Infectious Disease Among Inmates and Releasees From Correctional Facilities

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Introduction

It is widely believed that infectious diseases—particularly human immunodeficiency virus and acquired immunodeficiency syndrome (HIV/AIDS), sexually transmitted diseases (STDs), hepatitis, and tuberculosis (TB)—are much more prevalent among correctional inmates than in the total population and that, therefore, a disproportionate share of the burden of infectious disease is found among people who pass through correctional facilities. Largely because of the public health implications of potential transmission of disease from inmates to persons outside prison, there is growing recognition of the importance of improving prevention and treatment interventions in correctional settings. A number of authors have advocated strongly for taking better advantage of this important "public health opportunity."[1] Prevention and treatment programs for infectious disease in prisons and jails have improved in recent years, but there continues to be a general lack of public and political recognition of the importance of correctional settings for health interventions. Thus, the opportunity has yet to be fully exploited.

There is a potentially important two-part strategy for increasing the recognition of the public health problem and opportunity represented by infectious disease in correctional populations and for improving the policy response. It is to develop and disseminate (1) quantitative estimates of the burden of infectious disease among inmates and releasees and (2) quantitative analyses of the costs and benefits of prevention, early identification, and treatment of infectious disease among inmates. Neither of these estimates or analyses has been done systematically.

This paper addresses the first part of the strategy. Comparisons of the prevalence of HIV disease in correctional populations to that in the total population have been done,[2] but, to date, no one has sought to estimate the number of persons with infectious disease in all types of correctional facilities, the numbers of inmates with infectious disease who are being released to the community, or the proportion of the burden of infectious disease found among people who serve time in correctional facilities.

This paper presents national estimates of inmates and releasees with HIV infection and AIDS; syphilis, gonorrhea, and chlamydia infection; hepatitis B and C infection; and TB infection and TB disease. These figures should be considered rough estimates of the burden of infectious disease in correctional populations. It is impossible to present precise statistics because of the lack of systematic surveillance and the resulting paucity of observations on which prevalence estimates for many of the conditions of interest must be based. Moreover, as discussed in greater detail below, the estimates presented in this paper reflect some double counting between prison and jail populations, inmates and releasees, and jail releasees during a given year. The extent of this duplication cannot be quantified precisely, but it should be considered in using the estimates.

Prevalence and Incidence

Before proceeding to a discussion of data sources and estimation methods and presentation of the estimates, it is important to clarify the use of several key epidemiologic terms in this paper. The estimates and analyses presented here are based on point prevalence or period prevalence measures, meaning the percentage of a given population with a condition either at a particular point in time (e.g., at year-end) or over a period of time (e.g., over a 1-year screening period). Measures of prevalence should not be confused with incidence rates, which are intended to represent the risk of development of a condition within a susceptible population, for example, in terms of numbers of new cases per 1,000 or 100,000 individuals during 1 year. A susceptible population generally means those without the condition at the beginning of the period in which incidence is being measured.[3] Prevalence estimates are easier to calculate than incidence rates based on the available data for correctional populations, and they are more policy relevant in this context.

In this paper, the estimates of inmates with AIDS, HIV infection, and TB disease are based on point prevalence data. The estimates of inmates infected with syphilis, chlamydia, gonorrhea, TB, hepatitis B, and hepatitis C are based on period prevalence data. All estimates for releasees are also, in effect, period prevalence estimates that reflect the number of persons with certain infections or diseases who are released to the community during a given year.

Estimates of Numbers of Inmates and Releasees From Correctional Facilities

To estimate the burden of infectious disease among persons passing through correctional facilities, one must know the numbers of inmates and persons being released. The U.S. Department of Justice, Bureau of Justice Statistics (BJS), gathers and publishes statistics on numbers of prison and jail inmates and persons being released from prisons. The statistics on prisoners come from BJS's National Prisoner Statistics.[4] Statistics on jail populations come from BJS's Census of Jails conducted every 5 years and, in each intervening year, a sample-based *Prison and Jail Inmates at Midyear 1997*.[5] BJS's midyear 1997 inmate population statistics and data on 1996 releases (the latest available) were used because these reflect the situation closest to the date on which correctional systems provided data on HIV and AIDS to BJS's *Survey of Inmates in State and Federal Correctional Facilities*[6] and on STDs and TB to the *NIJ/CDC Ninth National Survey of HIV/AIDS, STDs, and TB in Correctional Facilities*,[7] on which many of the estimates are based.

This approach requires an estimate of the number of *unique* individuals released from jails and prisons during a specified year. Although BJS data report the number of releases from jails and prisons, they do not tell us the number of unique individuals. It is common for someone to be arrested and released more than once during a given year. Therefore, BJS data must be adjusted to provide an estimate of the number of releasees.

The National Institute of Justice (NIJ) provided Drug Use Forecasting (DUF, since renamed the Arrestee Drug Abuse Monitoring [ADAM] program) data from five sites. These data reported the number of times that an arrestee had been booked during the year just before the arrest that caused his or her inclusion in the DUF sample. Data were based on self-reports. Reasoning that arrests are generated by a Poisson process with unmeasured heterogeneity, those data were used to estimate that arrestees who admitted using cocaine or heroin weekly were arrested about 0.38 times per year while at liberty. These estimates were for weekly drug users because they are probably at greatest risk for the conditions of interest for this analysis. This estimate suggests that if A represents the number of arrests during a given year, then $A/1.38$ estimates the number of unique individuals who are arrested during the year.

Applying the factor of 1.38 will probably underestimate unique releasees because many of those at risk of arrest are not at liberty for the entire year. Because they are sometimes incarcerated, weekly drug users probably generate fewer than 0.38 arrests per year, so the estimate of the number of unique individuals booked into and

released from local jails is probably too small. On the other hand, people who are booked into and released from jail cannot be distinguished from those who are sentenced to jail. When the two populations are added up, some minor double counting results,[8] because most people serving jail terms must have been booked before being convicted. Dividing by 1.38 does not overcome that double counting. On balance, the convention of dividing BJS's figure for total number of jail releases by 1.38 probably provides an estimate of unique individuals that is close enough to reality for present purposes. Relying on this logic, BJS's estimate of 10 million jail releases was divided by 1.38 to yield an estimate of 7,246,377 individuals who were released from city and county jails during 1996.

The estimates also rely on the number of individuals who are released from State and Federal prisons, which BJS reports to have been 504,289 in 1996.[9] Because people typically spend 1 year or more in prison, the prison population is less likely to overlap the jail population. There may be some overlap because many people enter prison following parole violations. These people were probably arrested before being returned to prison, so there is some degree of overlap between jail releasees and prison releasees. This overlap is probably small, because persons returned to prison following a parole revocation typically serve long terms. A more troubling problem is that parole authorities often use short jail terms in lieu of longer prison terms as a response to technical parole violations. Use of jails for this purpose would certainly result in double counting, but it appears that parole violations account for less than 3 percent of the jail population, so the double counting cannot be severe.[10]

A count of prison releasees includes some duplicate counting because some prisoners are released on parole, have their releases revoked, and then are released again after serving the time attributed to their revocation. Again, because revocations usually result in lengthy prison stays, double counting of prison releasees is negligible. Therefore, BJS's figure for prison releasees has been used.

Overall Approach to Estimating the Burden of Infectious Disease

To estimate the number of unique individuals with condition *D* who pass through jails and prisons, a formula was applied:

$$N_D = 7{,}246{,}377\ P_J + 504{,}289\ P_P$$

Where:

N_D = the number of unique individuals with condition *D* who pass through jails and prisons
P_J = the proportion of people in jail with condition *D*
P_P = the proportion of people in prison with condition *D*

Much of the rest of this paper discusses how P_J and P_P were estimated.

Because of the paucity of data on which some of the estimates are based, their precision is questionable. The gross accuracy of the estimates can be checked on the basis of the epidemiology of the conditions under study. This method is described below and used to evaluate the estimates presented later in the paper.

Assume that a total of T_D people in the U.S. population have condition *D*. Assume, furthermore, that condition *D* always results from injection drug use and never from any other cause. Finally, assume that injection drug users (IDUs) have a 0.32 probability of being released from jail or prison during any given year.[11] Then,

$$N_D/T_D = 0.32$$

This is to say that 0.32 is the approximate upper limit to the ratio of people with condition *D* who are released from any jail or prison during a specified year to all people in the U.S. population with condition *D*.

If condition *D* sometimes results from injection drug use but frequently results from behaviors

that do not put people at high risk of arrest, then the equality does not hold, and instead:

$N_D/T_D \leq 0.32$.

Some concrete illustrations may help make the case. Injection drug use appears to be the major transmission factor for hepatitis C virus (HCV) infection. The equality would apply, so one would expect about 32 percent of all persons with HCV infection to be released from jail or prison during any given year.

In contrast, IDUs account for about 24 percent of current AIDS cases.[12] Thus, the ratio of N_D/T_D would be somewhat greater than 0.32×0.24, or 0.08, because there are other important risk factors for HIV infection, and persons with histories of some of these risk behaviors are overrepresented in correctional populations. Using similar reasoning, those released from prison should account for considerably less than 32 percent of the national burden of other diseases that are transmitted primarily through needle use.

HIV Infection and AIDS

Data sources and limitations

The best sources for statistics on the prevalence of HIV disease in prison and jail populations are the surveys conducted by BJS. Using its annual *Survey of State and Federal Correctional Facilities,* BJS compiles statistics on numbers of inmates with HIV infection and confirmed AIDS at year-end. BJS first compiled and presented these statistics for 1991.[13] The series has been continued annually since then.[14] BJS also conducts a *Census of Jails* every 5 years and an annual sample-based *Survey of Inmates in Local Jails*, from which it develops estimates of the number of jail inmates with HIV infection and the number and proportion of jail inmate deaths due to HIV/AIDS.

The BJS surveys should provide fairly accurate counts of State and Federal inmates with AIDS, assuming that the correctional systems gather and report the statistics accurately. Unfortunately, BJS has no control over the accuracy of the correctional systems' reporting, and it is hard to evaluate that reporting systematically for adjustment or estimation purposes. The BJS statistics have a major limitation with regard to prevalence rates and numbers of inmates with HIV infection in both State and Federal and city and county systems. This limitation makes it necessary to adjust BJS's figures. BJS compiles its statistics on HIV infection from State and Federal prison systems that have different HIV testing policies. Only 16 State correctional systems had mandatory HIV testing of all new inmates in 1997. Most prison systems have voluntary or on-request HIV testing, the aggregate results of which almost certainly underestimate true HIV seroprevalence because some HIV-infected inmates will not accept voluntary testing.[15] The problem is even more pervasive with regard to HIV prevalence among jail inmates, because no major jail systems have mandatory testing.

Estimates and estimation methods

A national point prevalence estimate of inmates with confirmed AIDS and a period prevalence estimate of releasees with confirmed AIDS are presented in table 1, broken down by prison and jail systems. These estimates combine men and women. Regional estimates are provided for State prison systems. The most recent BJS prevalence percentage for State and Federal prison inmates with AIDS was 0.5 percent at year-end 1996. Several systems did not respond to the 1996 BJS survey, so the national and regional prevalence percentages were applied to the total inmate populations at midyear 1997 to obtain the national and regional estimates. It is estimated that more than 6,000 State and Federal prison inmates had AIDS in 1997. Because the national prevalence of AIDS among State and Federal inmates has remained steady at 0.5 percent since 1993,[16] it seems reasonable to apply the 1996 prevalence percentage forward 1 year to obtain the AIDS prevalence estimate for 1997. The national prevalence estimate of 0.5 percent for State and Federal inmates in 1996 was applied to the total jail population in 1997 to develop a national estimate of more than 2,800 jail inmates with AIDS in 1997. The national estimate for prison and jail inmates with AIDS in 1997 is more than 8,900, representing 4 percent of the almost

Table 1. National and Regional Estimates of Inmates and Releasees with AIDS					
Category	Est. % w/ AIDS, 1996[a]	Population, 1997[b]	Est. Inmates w/AIDS, 1997	Releasees, 1996[c]	Est. Releasees w/AIDS, 1996
State/Federal Prison Systems[d]	**0.5**	**1,218,256**	**6,091**	**504,289**	**2,521**
Federal Bureau of Prisons (FBOP)	0.4	110,160	441	24,945	100
States: Northeast	1.3	167,706	2,180	61,293	797
States: Midwest	0.3	212,779	638	93,243	280
States: South[d]	0.5	484,391	2,422	175,695	878
States: West	0.3	243,220	730	149,112	447
City/County Jail Systems	**0.5**	**567,079**	**2,835**	**7,246,337[e]**	**36,232**
Total	**0.5**	**1,785,335**	**8,926**	**7,750,666**	**38,753**

[a] Bureau of Justice Statistics, *Survey of State and Federal Correctional Facilities, 1996*.
[b] Gilliard, D.K., and A.J. Beck, *Prison and Jail Inmates at Midyear 1997*. Bureau of Justice Statistics Bulletin. Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, January 1998, NCJ 167247.
[c] Bureau of Justice Statistics, *Correctional Populations in the United States, 1996.* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 1999, NCJ 170013.
[d] Includes District of Columbia.
[e] BJS estimate of 10,000,000 jail releasees divided by 1.38. See text for discussion of method.

229,000 people living with AIDS in the total U.S. population at the end of 1997.[17] The 0.5 percent prevalence of AIDS among inmates is more than five times the estimated prevalence of 0.09 percent in the total U.S. population.

To estimate the number of people with AIDS released from State and Federal prison systems, the same 0.5 percent prevalence was applied to the total number of releasees from State and Federal prisons in 1996, the most recent available statistics. The national estimate is more than 2,500 State and Federal prison releasees with AIDS in 1996. To estimate the number of people with AIDS released from city and county jails, the same 0.5 percent prevalence was applied to the estimate of unduplicated jail releasees derived as described above. It is estimated that more than 36,000 jail releasees had AIDS in 1996. The estimated total of prison and jail releasees with AIDS in 1996 is almost 39,000. Seventeen percent of the estimated 229,000 persons living with AIDS in the United States in 1996[18] passed through a correctional facility that year. This ratio is in line with the checking methodology outlined above.

Estimating the number of inmates with HIV infection was more complicated because of variable testing policies. Because of the uncertainties involved, an estimated range based on a range of possible point prevalence rates is presented. These point prevalence estimates are shown in table 2, again broken down by prisons and jails but combined for men and women. Numerous studies have shown that HIV seroprevalence rates for inmates tend to be higher among women than among men. The estimates reflect all HIV-infected inmates, including those with AIDS.

The lower bound of the estimate is based on applying BJS's 2.3-percent national HIV prevalence among State and Federal prison inmates in 1996 to the national total of State and Federal inmates, and BJS's regional prevalence rates to the regional totals of State inmates. The same was done to obtain the lower bound of State and Federal releasees with HIV infection.

Table 2. National and Regional Estimates of Inmates and Releasees with HIV Infection					
Category	Est. % HIV+, 1996 (Range)	Population, 1997	Est. HIV+ Inmates, 1997 (Range)	Releasees, 1996	Est. HIV+ Releasees, 1996 (Range)
State/Federal Prison Systems[a]	**2.3[b]–2.98**	**1,218,256**	**28,020–36,304[d]**	**504,289**	**11,599–15,028[d]**
FBOP	1.0–1.5	110,160	1,102–1,652	24,945	249–374
States: Northeast	7.5–7.85	167,706	12,577–13,165	61,293	4,597–4,812
States: Midwest	1.0–1.26	212,779	2,128–2,681	93,243	932–1,175
States: South[a]	1.9–2.93	484,391	9,203–14,193	175,695	3,338–5,148
States: West	0.8–1.88	243,220	1,946–4,573	149,112	1,193–2,803
City/County Jail Systems	**1.2[c]–1.8**	**567,079**	**6,805–10,207**	**7,246,377**	**86,956–130,435**
Total		**1,785,335**	**34,825–46,511**	**7,750,666**	**98,555–145,463**

[a] Includes District of Columbia.
[b] Bureau of Justice Statistics, *Survey of State and Federal Correctional Facilities, 1996.*
[c] Bureau of Justice Statistics, *1996 Survey of Inmates in Local Jails.*
[d] Regional estimates do not add to these totals due to rounding.

The upper bound was obtained by adjusting upward the aggregate HIV seropositivity rates reported to the BJS survey by the Federal prison system, which does not mandatorily test at intake, and by all but four of the States with voluntary testing. All of these adjustments are shown in table 3. The four voluntary testing States whose BJS figures were not adjusted were New York and Connecticut, whose reported seropositivity rates were very close to those found in blinded seroprevalence studies, and Oregon and Wisconsin, where comparative studies showed that seropositivity in voluntary testing was very similar to seroprevalence in blinded intake studies.[19]

For the other States and the Federal Bureau of Prisons, it was decided to increase the HIV seropositivity rate reported to BJS by 50 percent or by a specific adjustment factor for that system, if available. The adjustment factor was based on comparisons between seropositivity rates found in voluntary testing versus blinded seroprevalence studies. In high-prevalence States such as New York, Maryland, and California, rates from blinded studies were 2–3 times higher than in voluntary testing. In States such as Oregon and Wisconsin, by contrast, rates were similar. The extent of the discrepancy depends on the system's policy in encouraging inmates to be tested voluntarily and the receptivity of the inmates to being tested. Some inmates may be in denial or may fear discrimination, mistreatment, or breach of confidentiality. These conditions vary across and within systems. Therefore, 50 percent was considered a conservative upward adjustment for States without available comparisons of voluntary versus mandatory testing or blinded studies.

For the small number of systems that did not report HIV seropositivity statistics to BJS, BJS's seropositivity rate for the State's region was used if the State had mandatory testing or the regional rate was adjusted upward by 50 percent if the State had voluntary testing. Applying the estimated national prevalence range of 2.3–2.98 percent, which is 8–10 times the prevalence in the total U.S. population, it is estimated that between 28,000 and 36,000 State and Federal inmates had HIV infection in 1997 (table 2).

Because no major jail systems have mandatory HIV testing, the BJS prevalence estimate of 1.2 percent for jail inmates was used as the lower bound. This rate was adjusted upward by 50 percent to 1.8 percent to obtain the upper bound. This estimated national range is much lower than rates found in studies of certain large jail systems, notably New York City's, but is still 4–6 times the estimated prevalence of HIV infection in the total U.S. population.

Table 3. Derivation of HIV Prevalence Estimates for State and Federal Prison Systems					
Jurisdiction	**HIV Testing Policy**	**% HIV+ 1996 (BJS)**	**% HIV+ (Adjusted)**	**Population 1997**	**Est. HIV+ Inmates 1997 (Range)**
Northeast		7.5	7.85	167,706	12,577–13,165[i]
Connecticut	voluntary	4.6	4.6[a]	15,608	718–718
Maine	voluntary	0.3	0.45	1,559	5–7
Massachusetts	voluntary	3.6	5.0[b]	11,907	429–595
New Hampshire	mandatory	0.9	0.9	2,153	19–19
New Jersey	voluntary	3.0	4.5	27,766	833–1,249
New York	voluntary	13.6	13.6[c]	69,530	9,456–9,456
Pennsylvania	voluntary	1.9	2.85	34,703	659–989
Rhode Island	mandatory	3.9	3.9	3,293	128–128
Vermont	voluntary	0.3	0.45	1,187	4–5
Midwest		1.0	1.26	212,779	2,128–2,681[i]
Illinois	voluntary	1.6	2.4	40,425	647–970
Indiana	voluntary	—[d]	1.5	17,549	?–263
Iowa	mandatory	0.4	0.4	6,636	27–27
Kansas	voluntary	0.2	0.3	7,790	16–23
Michigan	mandatory	1.2	1.2	43,784	525–525
Minnesota	voluntary	0.5	0.75	5,348	27–40
Missouri	mandatory	0.9	0.9	23,687	213–213
Nebraska	mandatory	0.5	0.5	3,431	17–17
North Dakota	mandatory	0.4	0.4	739	3–3
Ohio	voluntary	0.7	1.05	47,248	331–496
South Dakota	voluntary	0.2	0.3	2,177	4–7
Wisconsin	voluntary	0.7	0.7[e]	13,965	98–98
South		1.9	2.93	474,652	9,018–13,907[i]
Alabama	mandatory	1.1	1.1	22,076	243–243
Arkansas	voluntary	0.9	1.35	9,539	86–129
Delaware	voluntary	—	2.85	5,313	?–151
Florida	voluntary	3.4	5.1	64,713	2,220–3,300
Georgia	mandatory	2.3	2.3	36,329	836–836
Kentucky	voluntary	0.5	0.75	13,858	69–104
Louisiana	voluntary	2.0	3.0	28,382	568–851
Maryland	voluntary	3.8	11.4[f]	22,415	852–2,555
Mississippi	mandatory	1.3	1.3	14,639	190–190
North Carolina	voluntary	2.0	3.0	32,334	647–970
Oklahoma	mandatory	0.7	0.7	19,931	140–140
South Carolina	voluntary[g]	2.1	3.15	21,021	441–662
Tennessee	voluntary	1.0	1.5	15,827	158–237
Texas	voluntary	1.4	2.1	136,599	1,912–2,869
Virginia	voluntary	1.5	2.25	28,673	430–645
West Virginia	voluntary	0.3	0.45	3,003	9–14

Table 3. Derivation of HIV Prevalence Estimates for State and Federal Prison Systems (continued)					
Jurisdiction	**HIV Testing Policy**	**% HIV+ 1996 (BJS)**	**% HIV+ (Adjusted)**	**Population 1997**	**Est. HIV+ Inmates 1997 (Range)**
West		0.8	1.88	243,220	1,946–4,573[i]
Alaska	voluntary	0.3	0.45	3,741	11–17
Arizona	voluntary	0.9	1.35	23,176	209–313
California	voluntary	0.8	2.4[h]	153,010	1,224–3,672
Colorado	mandatory	0.9	0.9	12,840	116–116
Hawaii	voluntary	0.7	1.05	4,491	31–47
Idaho	mandatory	0.5	0.5	4,105	21–21
Montana	voluntary	0.4	0.6	2,295	9–14
Nevada	mandatory	1.6	1.6	8,617	138–138
New Mexico	voluntary	0.2	0.3	4,692	9–14
Oregon	voluntary	0.5	0.5[e]	7,899	39–39
Utah	mandatory	0.7	0.7	4,154	29–29
Washington	voluntary	0.8	1.2	12,732	102–153
Wyoming	mandatory	0.3	0.3	1,468	4–4
FBOP	voluntary	1.0	1.5	110,160	1,102–1,652
Total		**2.3**	**2.98**		

[a] The rate reported to BJS in 1993 was close to that found in an anonymous mail intake study in the same year and to seroprevalence estimates for women. Therefore, the BJS figure was not adjusted. See Altice, F.L., F. Mostashari, P.A. Selwyn, P.J. Checko, R. Singh, S. Tanguay, and E.A. Blanchette, "Predictors of HIV Infection Among Newly Sentenced Male Prisoners," *Journal of AIDS and Human Retrovirology* 18(5)(1998): 444–453; and Mostashari, F., E. Riley, P.A. Selwyn, and F.L. Altice, "Acceptance and Adherence with Antiretroviral Therapy Among HIV-Infected Women in a Correctional Facility," *Journal of AIDS and Human Retrovirology* 18(4)(1998): 341–348.

[b] Blinded serosurveys, Mass. Department of Public Health, 1997.

[c] Close to blinded study results so not adjusted.

[d] Did not report to BJS Survey.

[e] Studies have shown voluntary and blinded studies yield similar HIV+ rates so not adjusted.

[f] Results of voluntary testing in 1991 reported to BJS—2.5% HIV+ versus results of blinded study in 1991—8.5% HIV+. (See Harlow, C.W. *HIV in U.S. Prisons and Jails.* Bureau of Justice Statistics Special Report. Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, September 1993, NCJ 143292; and Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System," California Department of Health Services, Office of AIDS, HIV/AIDS Epidemiology Office, March 1996). Thus, the BJS figure was inflated by 3.

[g] Mandatory testing began in 1998.

[h] Result of voluntary testing in 1994 as reported to BJS—0.8% HIV+ versus results of blinded study of incoming inmates in 1994—2.5% HIV+. (See Brien, P.M. and A.J. Beck, *HIV in Prisons 1994*. Washington DC: U.S. Department of Justice, Bureau of Justice Statistics, 1996, NCJ 158020; and Ruiz, J.D., and J. Mikanda, "Seroprevalence of HIV, Hepatitis B, Hepatitis C, and Risk Behaviors Among Inmates Entering the California Correctional System," California Department of Health Services, Office of AIDS, HIV/AIDS Epidemiology Office, March 1996). Thus the BJS reported rate was inflated by 3.

[i] State estimates do not add to these totals due to rounding.

The HIV prevalence estimate for jails was also compared to an estimate obtained by a different method. The percentage of inmates with self-reported injection drug use in the past 6 months (8.8 percent) in the 25 jail systems that participated in DUF over the period 1989–98 was multiplied by the estimated national HIV seroprevalence of 14 percent among IDUs based on analysis of data from 96 metropolitan areas in the United States.[20] This procedure yielded an estimate of 1.2 percent seroprevalence among jail inmates, identical to the BJS estimate of HIV seroprevalence among jail inmates nationwide.

Applying the range of 1.2–1.8 percent seroprevalence to the total number of jail inmates in 1997 yields an estimate of 6,800–10,200 jail inmates with HIV infection. The total estimate of almost 35,000

to more than 46,500 prison and jail inmates with HIV infection in 1997 represents 5–6 percent of all people living with HIV in the U.S. population.

Estimates of the numbers of prison and jail releasees with HIV infection (table 2) were obtained by applying the above prevalence ranges to the same population and release figures used for the AIDS estimates. This produced an estimate of between 98,000 and 145,000 people with HIV infection released from U.S. prisons and jails in 1996, including those with AIDS. Based on this range, it is estimated that between 13.1 and 19.3 percent of the roughly 750,000 people estimated by the Centers for Disease Control and Prevention (CDC) to be living with HIV infection in the United States in 1996 passed through a correctional facility that year. This range of percentages is within the parameters based on the checking methodology presented above.

Sexually Transmitted Diseases: Syphilis, Gonorrhea, and Chlamydia

Data sources and limitations

The sources for development of national estimates of the prevalence of STDs among correctional inmates are limited. The CDC's national STD surveillance program does not flag cases identified in correctional facilities. There are a few system-specific studies of syphilis and chlamydia prevalence.[21] CDC has recently initiated a system for monitoring prevalence of syphilis, gonorrhea, and chlamydia among jail inmates in the United States. Some early data are available from this system.[22]

The 1994 and 1997 national surveys of HIV/AIDS, STDs, and TB in correctional facilities that were sponsored by the CDC and NIJ sought data on STD screening policies and on the numbers of inmates who were screened and tested positive for syphilis, gonorrhea, and chlamydia during the 12 months before completion of the survey. The most useful data are the results of mandatory and routine screening, which are most representative of the total inmate population. Much data is missing, however, reflecting that many systems do not have mandatory or routine screening and that many of those that do screen (especially for syphilis) could not or would not report the results to the survey. The combination of statistics from the NIJ/CDC survey and the CDC STD Prevalence Monitoring Program provided enough observations with acceptable diversity of size and geographic location to produce supportable national estimates, as described below.

The data used to develop these prevalence estimates represent positive rapid plasma reagin (RPR) serologies for syphilis and positive tests for infection with gonorrhea and chlamydia. A number of qualifications must be noted, especially for the syphilis estimates, the first set of which indicates that the estimates based on such testing data may be overstated. The national incidence of syphilis has declined substantially since 1997; the disease is now concentrated in areas of the Southeast and some large cities outside that region. The sentinel surveillance jurisdictions in the CDC's STD monitoring program are heavily weighted toward those where syphilis remains more prevalent. More generally, the testing data on which estimates are based do not necessarily reflect active disease or infectiousness. The data reflect a combination of testing methodologies that may have different sensitivities. Data reported to the NIJ/CDC surveys probably do not represent confirmed positivity, and thus include some number of biological false positives for syphilis (which are associated with drug use or pregnancy). The data from the CDC's STD prevalence monitoring program are more likely to be based on confirmed positivity. Nevertheless, even confirmed RPR positivity does not indicate syphilis disease stage or infectiousness. Some proportion of confirmed positive results are in individuals with old, already treated infection. In addition, some percentage of inmates who test positive for STDs will be treated successfully during their incarceration. As a result, using estimates of STD positivity among incoming inmates to produce estimates of the number of offenders released with STDs may artificially inflate estimates of STDs among releasees.

On the other hand, intake jail testing usually does not occur until an individual has been in jail for at least 72 hours and, in some jurisdictions, at least 14 days. A large proportion of jail inmates are

probably released on bail or otherwise before receiving any intake screening. Sex workers and others likely to be at highest risk for STDs may be disproportionately represented among those released without having been screened. These circumstances would suggest that statistics on jail intake screening for STDs may understate the true prevalence of STDs among people passing through jails.

Another important consideration is that some STDs such as gonorrhea and chlamydia are often asymptomatic. Infected individuals may act as carriers and vectors of disease without becoming symptomatic or knowing of their own infection.

Estimates and estimation methods

As shown in table 4, it is estimated that between 46,000 and 76,000 prison and jail inmates and between 202,000 and 332,000 releasees had positive RPR serologies for syphilis in 1997. A positive RPR serology is only a crude indication of infection. It does not reflect disease stage or infectiousness. For the reasons enumerated above, these estimates may be overstated. The figures are based on a range of 2.6–4.3 percent prevalence of RPR positivity in prison and jail systems combined. Because of the regional differences in syphilis incidence noted above, two weighted average prevalence estimates were generated, combining statistics for mandatory or routine intake screening from the 1997 NIJ/CDC survey and for routine intake screening from the CDC's STD Prevalence Monitoring Program for 1997. The upper end is based on all observations available, including jurisdictions in the South, while the lower end excludes southern jurisdictions.

The observations used in both calculations are shown in tables 5a and 5b. The average was weighted by total inmate population in each system. Although gender differences are important in STD prevalence and course of infection, it was impossible to calculate separate estimates for men and women because many systems only reported aggregated data.

For gonorrhea and chlamydia, weighted averages were calculated that pooled State and Federal and city and county systems. This yielded estimated prevalence rates of 1.0 percent for gonorrhea and 2.4 percent for chlamydia. The period prevalence estimates shown in tables 6 and 7 suggest that almost 18,000 inmates and 77,000 releasees were infected with gonorrhea, and almost 43,000 inmates and 186,000 releasees were infected with chlamydia. These estimated prevalence rates were derived by calculating weighted averages of system-specific rates based on mandatory or routine intake screening reported to the 1997 NIJ/CDC survey and the CDC's STD Prevalence Monitoring Program in 1997. All of these observations are shown in tables 8 and 9.

Five jurisdictions reported gonorrhea prevalence data for women only to the CDC Prevalence Monitoring Program; seven jurisdictions reported chlamydia prevalence data for women only. These women-only rates were converted to overall rates based on comparison of gender-specific data for gonorrhea screening in San Francisco (1.7 percent of men and 2.5 percent of women) and Cook County (2.0 percent of men and 4.2 percent of women). Based on these comparisons, female gonorrhea prevalence rates were estimated to be 75 percent higher than male rates. The overall prevalence estimate was then calculated based on the gender distribution of jail inmates reported by BJS in 1997—89 percent men and 11 percent women.

Table 4. National Estimates of Inmates and Releasees with Positive RPR Serologies

Category	Est. % RPR+	Population, 1997	Est. RPR+ Inmates, 1997	Releasees, 1996	Est. RPR+ Releasees, 1996
All systems	2.6–4.3	1,785,335	46,597–76,537	7,750,666	202,292–332,271

Table 5a. Derivation of RPR+ Prevalence Estimates (Southern Jurisdictions Excluded)						
Jurisdiction[a]	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**	**Weight**	**Weighted % Positive**
NIJ/CDC Survey *(unless otherwise noted)*						
Idaho	2,540	3	0.1	4,105	0.020	0.001977
Illinois	22,722	246	1.1	40,425	0.195	0.214143
Iowa	4,090	2	0.5	6,636	0.032	0.015979
Kansas	6,540	65	1	7,790	0.038	0.037515
Massachusetts	9,956	530	5.3	11,907	0.057	0.303907
Missouri	14,716	73	0.5	23,687	0.114	0.057035
Nevada	3,384	20	0.6	8,617	0.041	0.024898
Oregon	6,769	34	0.5	7,899	0.038	0.019020
New Jersey	11,880	254	2.1	27,766	0.134	0.280798
Rhode Island	11,157	150	1.3	3,293	0.016	0.020616
West Virginia	1,850	16	0.9	3,003	0.014	0.013015
Wisconsin	5,551	56	1	13,965	0.067	0.067252
Wyoming	807	2	0.2	1,468	0.007	0.001414
Alameda, California	7,128	278	3.9	4,098	0.020	0.076966
Nassau, New York	10,500	276	2.6	1,739	0.008	0.021774
New York City, New York	120,765	11,728	9.7	17,528	0.084	0.818777
Philadelphia, Pennsylvania	21,441	2,322	10.8	5,563	0.027	0.289331
Maricopa, Arizona[b]			2.7	6,732	0.032	0.087533
San Francisco, California[c]	3,594	301	8.4	2,243	0.011	0.090734
Chicago (Cook), Illinois[d]	100,981	3,817	3.8	9,189	0.044	0.168156
Total				**207,653**	**1.000**	
Weighted Average Prevalence Estimate						**2.610839**

[a] Source is NIJ/CDC Survey unless otherwise noted.
[b] CDC STD Prevalence Monitoring Program, 1997.
[c] San Francisco Department of Public Health, STD Prevention and Control Section. September, 1998. *STD Screening: San Francisco County Jails, 1997.*
[d] Chicago Department of Public Health, STD/HIV Prevention Program, unpublished data.

Table 5b. Derivation of RPR+ Prevalence Estimates (Southern Jurisdictions Included)						
Jurisdiction/Source	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**	**Weight**	**Weighted % Positive**
NIJ/CDC Survey						
Arkansas	699	72	10.3	9,539	0.020	0.030
Georgia	13,811	457	3.3	36,329	0.195	0.114
Idaho	2,540	3	0.1	4,105	0.032	0.013
Illinois	22,722	246	1.1	40,425	0.038	0.127
Iowa	4,090	2	0.5	6,636	0.057	0.021
Kansas	6,540	65	1	7,790	0.114	0.025
Massachusetts	9,956	530	5.3	11,907	0.041	0.037
Mississippi	6,718	914	13.6	14,639	0.038	0.046
Missouri	14,716	73	0.5	23,687	0.134	0.075
Nevada	3,384	20	0.6	8,617	0.016	0.027
Oregon	6,769	34	0.5	7,899	0.014	0.025
New Jersey	11,880	254	2.1	27,766	0.067	0.087
Rhode Island	11,157	150	1.3	3,293	0.007	0.010
West Virginia	1,850	16	0.9	3,003	0.020	0.009
Wisconsin	5,551	56	1	13,965	0.008	0.044
Wyoming	807	2	0.2	1,468	0.084	0.005
Alameda, California	7,128	278	3.9	4,098	0.027	0.013
Washington, D.C.	10,568	1,634	15.5	6,873	0.032	0.022
Palm Beach, Florida	12,607	1,200	9.5	2,283	0.011	0.007
Pinellas, Florida	10,938	192	1.8	2,296	0.044	0.007
Dekalb, Georgia	1,682	72	4.3	2,491		0.008
Prince George's, Maryland	5,028	275	5.5	1,297		0.004
Nassau, New York	10,500	276	2.6	1,739		0.005
New York City, New York	120,765	11,728	9.7	17,528		0.055
Philadelphia, Pennsylvania	21,441	2,322	10.8	5,563		0.018
CDC STD Prevalence Monitoring Program						
Jefferson, Alabama			1.8	1,310	0.004	0.007421
Maricopa, Arizona			2.7	6,732	0.021	0.057205
San Francisco, California[a]	3,594	301	8.4	2,243	0.007	0.059297
Orange, Florida			10.4	3,411	0.011	0.111645
Fulton, Georgia			3.6	3,982	0.013	0.045116
Cook (Chicago), Illinois[b]	100,981	3,817	3.8	9,189	0.029	0.109895
Orleans, Louisiana			6.3	6,537	0.021	0.129612
Baltimore, Maryland			6.1	3,598	0.011	0.069074
Hinds, Mississippi			10.1	789	0.002	0.025080
Columbia, South Carolina			5.7	923	0.003	0.016558
Shelby, Tennessee			12.4	5,568	0.018	0.217293
Harris, Texas			6.7	8,224	0.026	0.173414
Total				**317,742**	**1.000**	
Weighted Average Prevalence Estimate						**4.287272**

[a] San Francisco Department of Public Health, STD Prevention and Control Section. September 1998. *STD Screening: San Francisco County Jails, 1997.*

[b] Chicago Department of Public Health, STD/HIV Prevention Program, unpublished data.

Table 6. National Estimates of Inmates and Releasees with Gonorrhea Infection					
Category	**Est. % w/ Gonorrhea Infection**	**Population, 1997**	**Est. Gonorrhea+ Inmates, 1997**	**Releasees, 1996**	**Est. Gonorrhea+ Releasees, 1996**
All systems	1.0	1,785,335	17,853	7,750,666	77,507

Table 7. National Estimates of Inmates and Releases with Chlamydia Infection					
Category	**Est. % w/ Chlamydia Infection**	**Population, 1997**	**Est. Chlamydia+ Inmates, 1997**	**Releasees, 1996**	**Est. Chlamydia+ Releasees, 1996**
All systems	2.4	1,785,335	42,848	7,750,666	186,016

Table 8. Derivation of Gonorrhea Prevalence Estimates					
Jurisdiction	**Year**	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**
NIJ/CDC Survey	1996–97				
Idaho		150	2	1.3	4,105
Wisconsin		2,500	11	0.4	13,965
Wyoming		807	1	0.1	1,468
CDC STD Prevalence Monitoring Program	1997				
San Francisco, California[a]		4,309	82	2.0	2,243
Connecticut		—	—	1.7	15,608
Washington, D.C.		—	—	1.1	6,873
Cook, Illinois[b]		108,941	2,475	2.3	9,189
Shawnee, Kansas		—	—	0.4	275
New York City, New York		—	—	1.4	17,528
Columbia, South Carolina		—	—	4.6	923
Shelby, Tennessee		—	—	0.8	5,568
Weighted Average Prevalence Estimate				**1.0**	

[a] San Francisco Department of Public Health, STD Prevention and Control Section. September 1998. *STD Screening: San Francisco County Jails, 1997.*
[b] Chicago Department of Public Health, STD/HIV Prevention Program, unpublished data.

Table 9. Derivation of Chlamydia Prevalence Estimates					
Jurisdiction	**Year**	**# Tested**	**# Positive**	**% Positive**	**Population, 1997**
NIJ/CDC Survey	1996–97				
Iowa		777	24	3.1	6,636
North Dakota		503	8	1.6	739
CDC STD Prevalence Monitoring Program	1997				
San Francisco, California*		5,106	317	6.2	2,243
Connecticut		—	—	2.8	15,608
Hawaii		—	—	2.3	4,491
Cook, Illinois		—	—	3.6	9,189
Shawnee, Kansas		—	—	1.4	275
New York City, New York		—	—	2.7	17,528
Multnomah, Oregon		—	—	3.6	1,467
King, Washington		—	—	1.8	2,412
Weighted Average Prevalence Estimate				**2.4**	

* San Francisco Department of Public Health, STD Prevention and Control Section. September 1998. *STD Screening: San Francisco County Jails, 1997.*

For chlamydia, San Francisco was the only jurisdiction for which gender-specific prevalence data were available. Because the data showed virtually identical rates for both sexes—6.2 percent among men and 6.1 percent among women—the chlamydia prevalence rate among women was used as the overall prevalence rate.

There are no reliable estimates of the prevalence of syphilis, gonorrhea, or chlamydia infection in the total U.S. population. The only prevalence statistics available are for demonstrably unrepresentative population segments, such as people requesting testing in STD or family planning clinics. Therefore, it is not possible to estimate the percentage of the total burden of these sexually transmitted infections that occurs among correctional populations.

Hepatitis B and C

Data sources and limitations

Data to develop national prevalence estimates of hepatitis B (HBV) and C (HCV) virus infection among correctional inmates are sparse. There is no national surveillance or systematically collected national data on hepatitis among inmates. The only direct data are from a few system-specific studies. The only two recent studies of HBV prevalence among inmates were done in the California State prison system[23] and the New York State prison system from 1987 to 1997.[24] An important issue for the epidemiology of HBV is that different markers have different meanings: reactivity to HBV surface antigen (HBsAg) indicates that a person is currently or chronically infected and possibly infectious, while reactivity to HBV core antibody (anti-HBc) and nonreactivity to HBsAg indicates that a person was infected at some unknown time in the past but is no longer infectious.

More correctional systems have conducted seroprevalence studies of HCV. Data are available from the States of California,[25] Connecticut,[26] Maryland,[27] Rhode Island,[28] and Washington.[29]

Estimates and estimation methods

An indirect method of estimation for HCV was used, given the paucity of direct prevalence data. HCV is thought to be transmitted primarily

through sharing drug injection equipment, although tattooing and body piercing may also be implicated. Sexual transmission of HCV is considered quite rare. According to the CDC, HCV prevalence among injection drug users is approximately 72–86 percent.[30] Available data suggest that about 24 percent of State prison inmates nationwide have histories of injection drug use.[31] A crude estimate of HCV seroprevalence among inmates can be obtained by multiplying these two percentages, yielding a range from 17 to 21 percent. This is substantially lower than the 30–41 percent found in the system-specific studies cited above: California—41 percent among male and female intakes;[32] Connecticut—32 percent among females;[33] Maryland—38 percent among men and women;[34] Rhode Island—33 percent among male and female inmates seeking culinary work assignments;[35] and Washington—30–40 percent among men and women.[36] Therefore the upper bound of national prevalence estimates was increased to 40 percent. Using this range of prevalence rates yields estimates of between 303,000 and 714,000 HCV-infected inmates and between 1.3 and 3.1 million HCV-infected releasees. This estimate of releasees with HCV suggests that an extremely high 29.3–68.9 percent of the estimated 4.5 million HCV-infected people in the U.S. population[37] served time in a correctional facility. The lower end of this ratio (29.3 percent) is within the 32 percent limit produced by the checking methodology presented earlier, but the upper end (68.9 percent) is more than double that limit.

Therefore, the range of prevalence rates was adjusted to produce ratios of correctional cases to total cases that fall within the 32 percent limit, even though this range is below the percentages found in all available system-specific studies. Table 10 presents national period prevalence estimates that 17.0–18.6 percent of prison and jail inmates and releasees were infected with HCV in 1996 and 1997, representing 303,000–332,000 inmates and 1.3–1.4 million releasees. Using the above method, it was not possible to provide separate estimates for prison and jail systems. The 17.0–18.6 percent prevalence range is between 9 and 10 times the estimated HCV prevalence of 1.8 percent in the U.S. population.[38]

The estimate of 1.3–1.4 million releasees with HCV suggests that an extremely high 29–32 percent of all persons with HCV infection passed through a correctional facility in 1996.

Given the extreme paucity of data on HBV prevalence and the different measures involved and reported, estimating national seroprevalence for this condition is perilous. The indirect estimation method used for HCV is not appropriate to HBV because HBV is commonly transmitted both sexually and parenterally.

Table 11 presents a period prevalence estimate that 2 percent of inmates and releasees, representing more than 35,000 inmates and 155,000 releasees, are positive for the HBV surface antigen (HBsAg) indicating current or chronic HBV infection and possible infectiousness. This estimate is based on

Table 10. National Estimates of Inmates and Releasees with Hepatitis C (HCV) Infection

Category	Est. % w/ HCV Infection* (Range)	Population, 1997	Est. Anti-HCV+ Inmates, 1997 (Range)	Releasees, 1996	Est. Anti-HCV+ Releasees, 1996 (Range)
All systems	17–18.6	1,785,335	303,507–332,072	7,750,666	1,317,613–1,441,624

* Defined as HCV antibody positive.

Table 11. National Estimates of Inmates and Releasees with Current or Chronic Hepatitis B Infection

Category	Est. % w/ HBsAg*	Population, 1997	Est. HBsAg+ Inmates, 1997	Releasees, 1996	Est. HBsAg+ Releasees, 1996
All systems	2	1,785,335	35,707	7,750,666	155,013

* Hepatitis B surface antigen.

the 2 State studies in California (1994) and New York (1987–97), which yielded similar results: 2.2 percent in California[39] and 1.8 percent in New York.[40] Time series data from New York indicate that the HBsAg seroprevalence among incoming inmates remained virtually flat between 1987 and 1997.[41] The proposed national estimate is 2 percent, which is 5 times the national prevalence estimate of 0.4-percent positivity to HBsAg.[42] The estimate of 155,000 releasees with HCV infection indicates that 12.4–15.5 percent of the national burden of chronic or current HBV infection (1–1.25 million persons)[43] in 1996 occurred in individuals who passed through a correctional facility that year. This ratio falls within the limit derived from the checking method described above.

Tuberculosis Infection and Disease

Data sources and limitations

The primary source for prevalence estimates of TB infection and disease among inmates is the 1997 NIJ/CDC survey. The survey sought data on the number of inmates screened by purified protein derivative (PPD) and the number who tested positive during the 12 months before the survey was completed, yielding a period prevalence estimate. In addition, the survey sought data on the number of inmates under treatment for active TB disease at the time the survey was completed, yielding a point prevalence estimate. Response rates were good for active TB disease—69 percent of State and Federal systems and 88 percent of city and county systems. They were lower but still probably adequate for TB infection (PPD screening)—47 percent of State and Federal systems and 61 percent of city and county systems.

An additional source of information on the prevalence of TB infection and disease is the CDC TB surveillance data. Since 1994, the CDC surveillance case report for TB disease has included a space to indicate whether the patient was a resident of a correctional facility at the time of diagnosis. The CDC surveillance data can be used to calculate period prevalence of TB disease in correctional settings as well as in the total population.

Estimates and estimation methodology

Prevalence estimates for TB disease and TB infection were calculated from the 1997 NIJ/CDC survey results using the same method applied to syphilis. Weighted average prevalence estimates were calculated on the basis of the inmate populations of the reporting systems. Table 12 presents point prevalence estimates that 0.04 percent of State and Federal prison inmates and 0.17 percent of city and county jail inmates—a total of more than 1,400 inmates in all systems—were under treatment for TB disease in 1997.

These prevalence rates are between 4 times (for State and Federal prison inmates) and 17 times (for city and county jail inmates) the rate of 0.01 percent found in the total U.S. population based on CDC surveillance data for 1996.[44] Applying the estimated prevalence among inmates to releasees indicates that 200 persons were released from State and Federal prisons with active TB in 1996, while more than 12,000 persons with active TB were released from city and county jails that year.

This suggests that 35 percent of the approximately 34,000 persons with active TB disease in

Table 12. National Estimates of Inmates and Releasees with Tuberculosis Disease

Category	Est. % with TB Disease	Population, 1997	Est. Inmates w/TB Disease, 1997	Releasees, 1996	Est. Releasees w/TB Disease, 1996
State/Federal prison systems	0.04	1,218,256	487	504,289	202
City/county jail systems	0.17	567,079	964	7,246,377	12,319
Total		**1,785,335**	**1,451**	**7,750,666**	**12,521**

the United States in 1996 passed through a correctional facility that year.

The prevalence of TB disease in the total U.S. population in 1996 was estimated by using data from the CDC's TB registry and TB surveillance reports. The TB registry reports, which provided data on numbers of prevalent cases of TB disease, were discontinued after 1994. After 1994, only incidence data on TB disease are available. Therefore, ratios of prevalence to incidence were calculated for 1992, 1993, and 1994. The prevalence of TB disease during a given year was taken to be the sum of cases at the start of the year and cases added during the year. The incidence figure was taken from the CDC's TB surveillance reports.[45] The average ratio of 0.627 for the 3 years was applied to the 1996 incidence figure of 21,337 to obtain an estimated prevalence of TB disease in that year of 34,030.

Table 13 shows the data from the prison and jail systems reporting to the 1997 NIJ/CDC survey that were used to calculate the TB disease prevalence estimates. According to the CDC surveillance data, 790 TB cases were diagnosed among correctional inmates in 1996, a figure very close to the 768 inmates reported to the 1997 NIJ/CDC survey as under treatment for active TB disease.

Tables 14 and 15 present the period prevalence estimates and underlying NIJ/CDC survey data for TB infection. It is estimated that 7.4 percent of State and Federal inmates and 7.3 percent of city and county inmates were PPD positive in 1997—more than 90,000 prison inmates and more than 41,000 jail inmates. Applying these prevalence percentages to releasees results in an estimate that more than 37,000 people with TB infection were released from State and Federal prisons in 1996, and almost 529,000 TB-infected people were released from city and county jails in that year. There are no estimates of the prevalence of PPD positivity in the total U.S. population, so it is not possible to calculate the percentage of the national burden of TB infection that is attributable to correctional facilities.

Conclusion

The estimates presented in this paper, as summarized in table 16, demonstrate that the burden of infectious disease among correctional inmates and releasees in the United States is heavy. Available comparative statistics show that the prevalence of AIDS, HIV infection, HCV, and TB disease are many times higher in correctional populations than in the total U.S. population, and that a disproportionate share of the burden of infectious disease is found among people who serve time in correctional facilities. During 1996, about 3 percent of the U.S. population passed through a correctional facility. By contrast, between 12 and 35 percent of the burden of key infectious diseases was found in this relatively small segment of the population.

The policy implication of these findings is clear. Correctional facilities are critical settings in which to provide interventions for the prevention and treatment of infectious diseases. Such interventions stand to benefit not only the inmates and their families and partners, but also the public health of the communities to which the vast majority of inmates return.

Table 13. Derivation of TB Disease Prevalence Estimates, NIJ/CDC Survey				
Jurisdiction	**Year**	**Inmates Under Treatment for TB**	**% w/TB Disease**	**Population, 1997**
State/Federal prison systems	1996–97			
Alaska		2	0.05	3,741
Arizona		5	0.02	23,176
Arkansas		5	0.05	9,539
Connecticut		1	0.006	15,608
Delaware		0	—	5,313
Georgia		17	0.05	36,329
Hawaii		0	—	4,491
Idaho		2	0.05	4,105
Iowa		0	—	6,636
Kentucky		0	—	13,858
Louisiana		6	0.02	28,382
Massachusetts		1	0.008	11,907
Mississippi		0	—	14,639
Missouri		2	0.008	23,687
Nevada		1	0.01	8,617
New Hampshire		0	—	2,153
New Jersey		19	0.07	27,766
New Mexico		0	—	4,692
New York		142	0.2	69,530
North Carolina		8	0.02	32,334
Oklahoma		6	0.03	19,931
Oregon		0	—	7,899
Pennsylvania		0	—	34,703
Rhode Island		2	0.07	3,293
Tennessee		4	0.03	15,827
Texas		74	0.05	136,599
Utah		0	—	4,154
Vermont		0	—	1,187
Virginia		0	—	28,673
West Virginia		6	0.2	3,003
Wisconsin		1	0.007	13,965
Federal Bureau of Prisons		16	0.01	110,160
Weighted Average Prevalence Estimate			**0.04**	

Table 13 (continued)

Jurisdiction	Year	Inmates Under Treatment for TB	% w/TB Disease	Population, 1997
Maricopa, Arizona		0	—	6,732
Alameda, California		3	0.07	4,098
Contra Costa, California		2	0.13	1,574
Fresno, California		2	0.09	2,107
Orange, California		4	0.07	5,368
Los Angeles, California		31	0.14	21,962
Riverside, California		20	0.79	2,528
San Bernardino, California		2	0.05	4,156
San Francisco, California		1	0.04	2,243
Santa Clara, California		1	0.02	4,588
Denver, Colorado		0	—	1,760
Washington, DC		0	—	6,873
Broward, Florida		0	—	4,125
Dade, Florida		0	—	7,320
Duval, Florida		4	0.16	2,507
Hillsborough, Florida		0	—	3,155
Orange, Florida		6	0.18	3,411
Palm Beach, Florida		2	0.09	2,283
Pinellas, Florida		0	—	2,296
Dekalb, Georgia		5	0.2	2,491
Cook, Illinois		9	0.1	9,189
Prince Georges, Maryland		0	—	1,297
Wayne, Michigan		0	—	2,708
Essex, New Jersey		1	0.05	2,025
Passaic, New Jersey		3	0.15	1,942
Nassau, New York		0	—	1,739
New York City, New York		63	0.36	17,528
Cuyahoga, Ohio		0	—	1,705
Franklin, Ohio		2	0.13	1,501
Philadelphia, Pennsylvania		70	1.26	5,563
Shelby, Tennessee		26	0.47	5,568
Bexar, Texas		3	0.08	3,683
Tarrant, Texas		1	0.03	3,366
Travis, Texas		0	—	2,132
King, Washington		0	—	2,349
Weighted Average Prevalence Estimate			**0.17**	

Table 14. National Estimates of Inmates and Releasees with TB Infection*

Category	Est. % PPD+	Population, 1997	Est. PPD+ Inmates	Releasees, 1996	Est. PPD+ Releasees, 1996
State/Federal prison systems	7.4	1,218,256	90,151	504,289	37,317
City/County jail systems	7.3	567,079	41,397	7,246,377	528,986
Total		**1,785,335**	**131,548**	**7,750,666**	**566,303**

* Defined as positive PPD skin test.

Table 15. Derivation of TB Infection Prevalence Estimates

Jurisdiction	Year	# Tested	# PPD+	% PPD+	Population, 1997
State/Federal prison systems	1996–97				
Connecticut		21,660	856	3.9	15,608
Delaware		45,944	324	0.7	5,313
Georgia		15,407	1,089	7.1	36,329
Hawaii		5,447	211	3.9	4,491
Idaho		3,832	76	2.0	4,105
Iowa		8,275	145	1.8	6,636
Kansas		8,069	1,283	15.9	7,790
Maryland		23,095	283	1.2	22,415
Massachusetts		15,525	506	3.3	11,907
Mississippi		10,942	442	4.0	14,639
Missouri		27,238	592	2.2	23,687
Nebraska		1,750	65	3.7	3,431
Nevada		12,617	380	3.0	8,617
New Jersey		10,154	386	3.8	27,766
New York[a]		11,366	2,546	22.4	69,530
North Carolina		17,031	836	4.9	32,334
Oklahoma		12,300	227	1.8	19,931
Oregon		11,428	323	2.8	7,899
Rhode Island		13,000	190	1.4	3,293
Utah		3,537	213	6.0	4,154
Virginia		9,974	489	4.9	28,673
West Virginia		1,850	12	0.6	3,003
Wisconsin		11,463	156	1.4	13,965
Wyoming		696	13	1.9	1,468
Weighted Average Prevalence Estimate				**7.4**	

Table 15 (continued)

Jurisdiction	Year	Number Tested	Number PPD+	% PPD+	Population, 1997
City/County jail systems	1996–97				
Alameda, California		38,510	4,447	11.5	4,098
Contra Costa, California		6,100	405	6.6	1,574
Orange, California		22,749	1,935	8.5	5,368
Riverside, California		8,494	377	4.4	2,528
Washington, D.C		4,716	304	6.4	6,873
Dade, Florida		9,157	1,188	13.0	7,320
Hillsborough, Florida		52,728	2,063	3.9	3,155
Orange, Florida		12,263	289	2.4	3,411
Palm Beach, Florida		12,613	691	5.5	2,283
Pinellas, Florida		5,400	274	5.1	2,296
Dekalb, Georgia		16,094	1,318	8.2	2,491
Cook, Illinois		22,673	954	4.2	9,189
Prince Georges, Maryland		15,365	983	6.4	1,297
Wayne, Michigan		15,562	1,042	6.7	2,708
Clark, Nevada		1,786	171	9.6	2,113
Essex, New Jersey		16,000	960	6.0	2,025
New York City, New York[a]		76,516	8,806	11.5	17,528
Cuyahoga, Ohio		1,316	79	6.0	1,705
Franklin, Ohio		3,948	57	1.4	1,501
Philadelphia, Pennsylvania		20,230	793	3.9	5,563
Shelby, Tennessee		4,573	131	2.9	5,568
Bexar, Texas		41,475	796	1.9	3,683
Tarrant, Texas		15,870	657	4.1	3,366
Travis, Texas		13,800	1,500	10.9	2,132
King, Washington		1,923	224	11.6	2,349
Durham, North Carolina[b]		1,009	89	8.8	477
Weighted Average Prevalence Estimate				**7.3**	

[a] Mikl et al. 1998 (blinded intake studies, 1987–97).
[b] Jones 1998.

Table 16. Burden of Infectious Disease Among Inmates and Releasees

Condition	Est. Prevalence Among Inmates, %		Est. # of Inmates w/ Condition, 1997	Est. # of Releasees w/ Condition, 1996	Total # in U.S. Population w/ Condition, 1996	Releasees w/ Condition as % of Total in U.S. Population w/Condition, 1996
	Prisons	Jails				
AIDS	0.5[a]	0.5[a]	8,900	39,000	229,000[b]	17.0
HIV Infection	2.3–2.98[c]	1.2–1.8[d]	35,000–47,000	98,000–145,000	750,000[e]	13.1–19.3
Positive RPR Serology (Syphilis)	2.6–4.3	2.6–4.3	46,000–76,000	202,000–332,000	N/A	—
Chlamydia Infection	2.4	2.4	43,000	186,000	N/A	—
GC Infection	1.0	1.0	18,000	77,000	N/A	—
HBV (HBsAg+)	2.0	2.0	36,000	155,000	1,000,000–1,250,000[f]	12.4–15.5
HCV (anti-HCV+)	17–18.6[g]	17–18.6[g]	303,000–332,000	1,300,000–1,400,000	4,500,000[h]	28.9–32.0
TB Disease	0.04[i]	0.17[j]	1,400	12,000	34,000[k]	35.3
TB Infection (PPD+)	7.4	7.3	131,000	566,000	N/A	—

[a] >5 times prevalence in U.S. population (0.09%).
[b] Centers for Disease Control and Prevention, *HIV/AIDS Surveillance Report, 1997*.
[c] 8–10 times prevalence in U.S. population (0.3%).
[d] 4–6 times prevalence in U.S. population (0.3%).
[e] CDC estimate, based on midpoint of 1993 estimate (Rosenberg 1995).
[f] CDC, *Morbidity and Mortality Weekly Report*, November 22, 1991.
[g] 9–10 times prevalence in U.S. population (1.8%)
[h] Based on prevalence estimate in McQuillan et al (1997).
[i] 4 times prevalence in U.S. population (0.01%).
[j] 17 times prevalence in U.S. population (0.01%).
[k] Estimated from Centers for Disease Control and Prevention, *TB Registry Reports, 1992–94*. See text for discussion.

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8. About 322,000 sentenced inmates were in jail on the day of BJS's 1997 annual jail survey (Gilliard, D.K., and A.J. Beck, *Prison and Jail Inmates at Midyear 1997* [see note 4]). If sentenced inmates could serve about X months on average in jail, then one could estimate that roughly 322,000 x 12/X unique sentenced inmates are released during the year. Unfortunately, estimates of the average jail term served by sentenced inmates are not readily available. If the average jail term is 3 months, then roughly 1,288,000 unique sentenced inmates are released from jail every year. Not all of these could have been arrested during that same year. About 322,000 must have begun their jail terms before the year started, reducing the potential overlap to 966,000. But many sentenced jail inmates must also have been arrested before the year started, because there is often a considerable delay between arrest and conviction. If this delay averages 3 months, then the overlap should be reduced by 322,000, leaving a potential overlap of 644,000. Provided this estimate is not grossly wrong, it suggests that the overlap is a small part of the roughly 10 million jail releases estimated by BJS to have occurred during 1996.

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