



Review article

Age-Specific Global Prevalence of Hepatitis B, Hepatitis C, HIV, and Tuberculosis Among Incarcerated People: A Systematic Review



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A B S T R A C T

Purpose: This study aims to compare the global prevalence of hepatitis B, hepatitis C, HIV, and tuberculosis in incarcerated adolescents and young adults (AYAs) and older prisoners.

Methods: This study is a systematic review and meta-analysis of studies reporting the age-specific prevalence of each infection in prisoners. We grouped age-specific prevalence estimates into three overlapping age categories: AYA prisoners (<25 years), older prisoners (≥25 years), and mixed category (spanning age 25 years). We used random effects meta-analysis to estimate the relative risk (RR) of each infection in AYAs versus older prisoners.

Results: Among 72 studies, there was marked heterogeneity in prevalence estimates among AYA prisoners for all infections: hepatitis B (.4%–25.2%), hepatitis C (.0%–70.6%), HIV (.0%–15.8%), and active tuberculosis (.0%–3.7%). The pooled prevalence of HIV (RR = .39, 95% confidence interval .29–.53, I^2 = 79.2%) and hepatitis C (RR = .51, 95% confidence interval .33–.78, I^2 = 97.8%) was lower in AYAs than in older prisoners.

Conclusions: The prevalence of HIV and hepatitis C is lower in AYA prisoners than in older prisoners. Despite lower prevalence, acquisition begins early among incarcerated populations. There is an urgent need for targeted, age-appropriate prevention, treatment, and harm reduction measures in and beyond custodial settings to reduce the incidence of infection in these extremely vulnerable young people.

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IMPLICATIONS AND CONTRIBUTION

Preventing incident HIV and hepatitis C infection in incarcerated adolescents and young adults will require both age-appropriate prevention, treatment, and harm reduction efforts in custodial settings, and increased investment in age-appropriate, evidence-based transitional programs to support continuity of health care between prison and community.

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The world prison population is growing at a rate in excess of general population growth and is currently at least 10.35 million, with several-fold more transitioning through these settings every year [1]. The age structure of this population at the global level is unknown, but in countries where data are publicly available, young people (aged <25 years) are markedly overrepresented [2–4] and, because they are typically incarcerated for shorter periods of time than their older counterparts, they tend to cycle through custodial settings more rapidly and thus form an even larger proportion of the “churn” through these settings [3]. Global data on detained adolescents are not available; however, it is evident that millions of adolescents and young adults (AYAs) cycle through custodial settings every year. The vast majority of these—greater than 90% in most countries where data are available—are male [4–6].

Age cutoffs for determining whether AYAs are incarcerated in juvenile justice facilities or adult prisons differ between countries, and some countries do not have a separate juvenile justice system. In the U.S., there is a further distinction between prisons (for sentences of more than 1 year) and jails (for persons awaiting trial or sentencing, or sentenced to less than 1 year). In the interests of brevity, throughout this manuscript we use the terms “prison” or “custodial setting” to describe all of these facilities, and “prisoners” to describe the people held in these facilities.

There is a high prevalence of HIV, viral hepatitis, and tuberculosis (TB) in prisoners compared with the corresponding non-incarcerated population. A recent systematic review estimated that the global prevalence of infection among prisoners was 4.8% for hepatitis B virus (HBV), 15.1% for hepatitis C virus (HCV), 3.8% for HIV, and 2.8% for active TB [7]. Prevalence estimates in that study were disaggregated by sex but not by age. The concentration of infectious disease among prisoners produces an imperative to both treat those infected and prevent transmission of infection to those at risk.

Young people in custodial settings are distinguished by a high prevalence of complex health-related needs, substance use, and sexual risk behaviour, typically set against a backdrop of trauma and entrenched social disadvantage including low education, unemployment and poverty, and increased risk of homelessness [8–12]. Studies of the prevalence of infectious disease in these incarcerated young people have never been synthesized, but there is good reason to suspect that the prevalence of infection in prisoners will vary according to age. In the general population, chronic viral hepatitis and HIV prevalence are higher in older age groups, as a result of both increased time spent at risk of infection and time spent at risk before the introduction of control measures in the 1990s and 2000s [13–15]. With improvements in treatment, those who are HIV infected are living longer, further contributing to higher HIV prevalence among older aged populations [15]. The prevalence of TB in the general population also varies with age, as a function of both the intensity of transmission and the age structure of societies [16]. In endemic settings, TB prevalence is generally lower among AYAs than among adults in middle age and the elderly [17], whereas in high-income countries, the age-related epidemiology of TB is tied to age-specific patterns of migration [16].

However, prisoners are not representative of the populations from which they are drawn, and are distinguished by both a relatively high prevalence of risk behaviors for bloodborne in-

fection (e.g., injection drug use, unprotected sex, unsterile body modification practices) [18–20] and comparatively poor access to vaccination, harm reduction, and other preventive measures [21,22]. Few prison settings provide adequate access to infection control measures such as sterile injecting and tattooing equipment, or condoms, and outbreaks of infection in prison settings have been documented [7,21,23]. There is some evidence that these risk behaviors are more prevalent among young and male prisoners [18,24], such that one might expect the incidence of bloodborne infections to be particularly high among young, incarcerated men. This reality is an outcome of the criminalization of substance use globally [25].

Furthermore, among people who inject drugs, hepatitis C seroconversion typically occurs within a few years of initiating injecting [26,27], such that the prevalence of this infection may be similar in young and older prisoners, given the high prevalence of drug injection in prisoners [18]. In fact, some studies have reported a higher prevalence of HCV in young prisoners than in older prisoners [19], although others find that despite a higher prevalence of bloodborne virus (BBV) risk behaviors in young prisoners, the prevalence of HCV infection is lower, suggesting a possibly brief window for preventive intervention [28].

Prisons are also high-risk congregate settings that, particularly in the absence of routine screening, treatment, and infection control, are conducive to TB transmission [29]. This risk is further elevated in immunocompromised individuals, such as those living with HIV [30]. Given evidence that adolescents are at higher risk of progression to active TB after exposure than are adults [31], incarcerated youth may likewise be at comparatively elevated risk of incident TB infection. Whether or not this translates into a higher prevalence of TB infection among young people in prison settings remains unclear.

Incarcerated youth: a global health priority

The comparatively high prevalence of infection and associated risk behavior in prisoners makes effective prevention with this population—virtually all of whom return to the community—a public health priority [32]. To the extent that the prevalence of infection is lower in young prisoners than in older prisoners, the opportunity and imperative for prevention with these young people is proportionately greater. This notion of disproportionate benefit (the so-called triple dividend) was highlighted recently by the Lancet Standing Commission on Adolescent Health and Wellbeing, which both identified incarcerated adolescents as a highly vulnerable group, and identified a critical need for better data on the health of adolescents, particularly vulnerable adolescents [33,34]. Similarly, both the World Health Organization (WHO) and the United Nations have identified prisoners as a key population for HIV and viral hepatitis responses, and highlighted that young people often constitute an especially vulnerable subgroup of prisoners [35,36].

Through systematic review and meta-analysis, the aims of this study were to (1) compare the prevalence of hepatitis B, hepatitis C, HIV, and TB in incarcerated AYAs (aged <25 years) versus older prisoners (aged ≥25 years); and (2) compare the prevalence of each infection in incarcerated AYA males versus females. We hypothesized that there would be an age gradient in the prevalence of all infections, although this gradient would be less steep for HBV, given that vertical transmission is the key driver of HBV infection in many settings [37].

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