Perspective
HIV Disease in the Caribbean

The 2007 estimated prevalence of adult HIV infection in the Caribbean region was 1.1%. Prevalence rates in the large Caribbean countries ranged from 1.1% in the Dominican Republic to 3% in the Bahamas, with the highest rates in men who have sex with men, female sex workers, tuberculosis (TB) patients, crack-cocaine users, children living on the streets, and prisoners. HIV disease is the leading cause of death among Caribbean people aged 25 years to 44 years. There are an estimated 20,000 new infections per year, representing 2 new infections for every patient starting antiretroviral therapy. The CIPRA HT001 trial, which assessed 2006 World Health Organization guidelines for antiretroviral therapy initiation, showed substantial reduction of mortality and new-onset tuberculosis with treatment starting at CD4+ cell counts between 200/µL and 350/µL versus initiating at counts below 200/µL. However, in practice, CD4+ cell count at the start of treatment remains well below 200/µL in the majority of locales. Successes in the battle against HIV disease in the Caribbean include reduction in prevalence and mother-to-child transmission rates in some locales, increased use of antiretroviral therapy, increased use of condoms by female sex workers, and vastly improved safety of donated blood units. Much work remains to be done. This article summarizes a presentation by Jean William Pape, MD, at the International AIDS Society–USA continuing medical education program held in New York City, just weeks before the devastating earthquake in Haiti on January 12, 2010. The original presentation is available as a Webcast at www.iasusa.org.

Note:
The following article summarizes an overview of the HIV epidemic in the Caribbean that was presented by Dr Pape mere weeks before Haiti was struck by the devastating earthquake of January 12, 2010. With editorial assistance from Dr Pape’s colleague, Dr Daniel W. Fitzgerald, the presentation summary was updated, while Dr Pape focused on the immediate and continuing effects of the earthquake’s destruction. In January 2010, the IAS–USA selected Haiti’s largest provider of HIV and AIDS care, education, and research, GHESKIO (the Haitian Group for the Study of Kaposi’s Sarcoma and Opportunistic Infections, of which Dr Pape is Director), as its 2010 Charitable Partner. Throughout 2010, individual donors from IAS–USA live CME courses generously provided more than $21,000, which went directly to GHESKIO for its rebuilding efforts. GHESKIO also used these funds to continue providing humanitarian assistance to those affected by the disaster and life-saving medications to people with HIV and AIDS. For updates on the progress of GHESKIO, or to contribute additional funds, visit www.gheskio.org.

Introduction
The Caribbean region consists of 29 nations or territories with Spanish, Dutch, French, and British influences. The total population includes approximately 39 million individuals of African, European, and Asian descent, and indigenous groups. There is extensive cultural and religious diversity among groups and substantial mobility within the population. Approximately 20 million visitors travel to the Caribbean each year from the United States. Data from 2007 indicate that the Caribbean was the largest contributor of new diagnoses of HIV infection in the US foreign-born population in New York City, accounting for 38% of cases, with the total increasing to 55% if new diagnoses in individuals born in Puerto Rico are included (New York City Department of Health and Mental Hygiene, 2009).

Characteristics of the Epidemic
In 2007, the estimated prevalence of adult HIV infection in the Caribbean was 1.1%, compared with 0.6% in North America and 0.5% in Latin America (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2009). The epidemic is both generalized and sustained (rates, 1%–3%) in the general population, reflecting largely heterosexual transmission, and it is concentrated at much higher prevalences in men who have sex with men (MSM), female sex workers, prisoners, tuberculosis (TB) patients, crack-cocaine users, and children living on the streets. HIV disease is the leading cause of death among people aged 25 years to 44 years. An estimated 20,000 new infections occur annually, a rate of approximately 55 new infections per day.

No infections with HIV-2 have been documented in the Caribbean, and the predominant HIV-1 subtype is B. Subtypes C, D, F, G, H, and J and recombinants have been reported in Cuba; subtype A in Martinique; A and F in French Guiana; D and B/F in Puerto Rico, and B (Trinidad variant) and D in Trinidad and Tobago (Cuevas et al, AIDS, 2002; Kazanjii et al, AIDS Res Hum Retroviruses, 2001; Cleghorn et al, Proc Natl Acad Sci USA, 2000; Flores et al, Emerg Infect Dis, 1999; Ouka et al, J Acquir Immune Defic Syndr Hum Retrovir, 1998).

Of the estimated 261,000 persons living with HIV infection in the Caribbean as of 2007, approximately 70% live on the island of Hispaniola, which comprises Haiti (~120,000 cases, 46%)

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and the Dominican Republic (~62,000 cases, 24%). Among the remaining larger countries, these 2 are followed by Jamaica (~27,000 cases), Trinidad and Tobago (14,000), Guyana (15,000), Surinam (6800), the Bahamas (6200), Belize (3600), and Barbados (2200) (data compiled from the UNAIDS, GHESKIO, and the World Health Organization [WHO]). Apart from Cuba, with its estimated HIV seroprevalence rate of less than 0.05%, seroprevalence rates in the larger countries range from 1.1% in the Dominican Republic to 5% in the Bahamas.

In some regions, the epidemic has been stabilized, with current prevalence rates in the Dominican Republic, Jamaica, Haiti, Guyana, and the Bahamas representing marked reductions from peak prevalence rates in prior years (Figure 1). Seroprevalence rates reported from several of the countries are much higher in MSM and female sex workers than the national rates, as are seroprevalence rates reported in prison populations (Figure 2). It is noteworthy that very high seroprevalence rates in MSM are found in locales that criminalize same-sex sexual practices (eg, Trinidad and Tobago, Jamaica).

Currently, heterosexual transmission is implicated in approximately 60% to 80% of cases of infection, with homosexual or bisexual transmission accounting for 10% to 15%, mother-to-child transmission (MTCT) for 6% to 10%, and unknown risk factors (which could largely reflect risk in MSM) for 17% to 20%. Injection drug use (IDU) is an uncommon mode of transmission except in Puerto Rico (where it contributed substantially to the early epidemic) and Bermuda; elsewhere, it primarily reflects a risk factor in US criminal deportees.

Although HIV transmission through infected blood and blood products was a primary driver of the early epidemic in many locales, it is now rare. The epidemic has grown among women, with the percentage of cases in women increasing from 24% in 1990 to 43% in 2007 (UNAIDS, 2010). Various studies in Caribbean populations have shown that cofactors for transmission in HIV-serodiscordant couples include absence of condom use, clinical disease in index cases in both men and women, and sexually transmitted infections in the HIV-seronegative partner (including genital ulcers, seropositive syphilis, and genital discharge) (Deschamps et al, Ann Intern Med, 1996). In Jamaica, a comprehensive program has led to a marked reduction in sexually transmitted infections (Figueroa,
West Indian Med J, 2001), and another program in the Dominican Republic has been successful in preventing infections in female sex workers.

Behavioral and cultural factors contributing to the epidemic include sexual relations that notably feature the “macho” concept, which encourages men to have numerous sex partners and initiate sexual activity early in life. As part of this concept, men who have sex with both women and men do not consider or report themselves as MSM. IDU continues to fuel the epidemic in Puerto Rico, and drug use among men continues to account for most of the transmission in the heterosexual population (Centers for Disease Control and Prevention [CDC], MMWR, 2009). Studies in the Caribbean have shown that consistent condom use is protective, although there is difficulty in interpreting self-reported condom use. Poverty is certainly a factor limiting consistent condom use. Policies supporting consistent condom use in female sex workers are needed in many locales.

Natural History of HIV Infection and Effects of Treatment

Studies in Caribbean populations have shown rapid progression of HIV disease after initial infection (Inciardi et al, AIDS Care, 2005). In Haiti, patients progressed to symptomatic HIV disease an average of 3 years after primary infection and to AIDS after 5.2 years, and died after 7.4 years (Deschamps et al, AIDS, 2000). A study in Trinidad showed progression to AIDS by 4.8 years after infection and death by 5.6 years (Blattner et al, J Infect Dis, 2004). Interaction of HIV-1 with human T-cell lymphotropic virus type 1 (HTLV-1), which has a prevalence of 2% to 5% in persons of African ancestry in the region, may be a factor in this rapid progression rate. Studies in Trinidad indicate that HTLV-1 coinfection is associated with rapid progression to AIDS, with other studies indicating that HIV-1 coinfection does not increase the viral load of HTLV-1 (Cé saire et al, AIDS Res Hum Retroviruses, 2001). CD4+ cell counts can be artificially increased in coinfected, posing difficulties in management.

TB also appears to accelerate HIV disease. In an early study, HIV-infected patients were randomly selected to receive preventative treatment with isoniazid plus vitamin B6, or vitamin B6 alone. Isoniazid treatment reduced risk of active TB and risk of progression to AIDS (Figure 3; Pape et al, Lancet, 1993). Another study found that whereas HIV-seropositive patients were at increased risk of TB recurrence compared with HIV-seronegative patients, use of isoniazid markedly reduced this risk in HIV-infected patients (Fitzgerald et al, Lancet, 2000).

A study reported in 1999 showed that without antiretroviral therapy, approximately 80% of HIV-infected children in Haiti were dead within 2 years of acquiring HIV infection (Jean et al, Pediatr Infect Dis, 1999). A 2007 study showed that with antiretroviral therapy, 80% remained alive at 2 years after infection (George et al, J Infect Dis, 2007). In adults in the Caribbean, 1-year survival after initiation of antiretroviral therapy is approximately 90% (Severe et al, N Engl J Med, 2005). Five-year survival has been estimated at 75%, with rates of 64% in patients aged 13 years to 24 years, 78% in those aged 25 years to 50 years, and 64% in those older than 50 years (Leger et al, N Engl J Med, 2009). At GHESKIO, 5 consecutive yearly cohorts of all patients receiving antiretroviral therapy were assessed from 2003 to 2007, with 1-year survival ranging from 90% to 93%. Factors associated with early mortality included CD4+ cell count below 50/µL, low body mass index, hemoglobin value below 8.5 g/dL, and coinfection with active TB.

A recent study in 201 patients coinfected with AIDS and TB found that patients starting TB treatment within 3 months after initiating antiretroviral therapy had a markedly lower 2-year survival rate than did patients receiving antiretroviral therapy and TB treatment at other times relative to each other (Koenig et al, Clin Infect Dis, 2009). Two-year mortality was 27% in patients starting TB treatment within 3 months after initiating antiretroviral therapy, 10% in those starting TB treatment before antiretroviral therapy, and 2% in those starting TB treatment more than 3 months after initiating antiretroviral therapy. The high mortality rate in patients starting TB treatment within 3 months is likely attributable to the masking effect of HIV disease. Patients probably had TB at the time of antiretroviral therapy initiation, but TB was diagnosed only after reconstitution of the immune system or with more careful clinical surveillance (Koenig et al, Clin Infect Dis, 2009). In part, this finding may reflect the increased frequency of multidrug-resistant TB (MDR-TB) in HIV-infected patients.

![Figure 3. Effectiveness of preventive treatment with isoniazid (I) on risk of active tuberculosis (left) and progression to AIDS (right) in patients receiving supplementation with vitamin B6. Adapted from Pape et al, Lancet, 1993.](image-url)
One study showed that MDR-TB was found in 11 (10%) of 115 HIV-infected patients compared with 5 (3%) of 166 HIV-seronegative patients (relative risk, 3.2; \( P = .03 \)) (Joseph et al, *AIDS*, 2006). MDR-TB was implicated in 10 (20%) of 49 cases of recurrent TB.

A more recent trial (CIPRA HT 001 trial) in Haiti compared standard timing of antiretroviral therapy initiation, following 2006 WHO guidelines, with earlier initiation of antiretroviral therapy (Severe et al, *N Engl J Med*, 2010). Patients were randomly selected to receive early initiation at CD4+ cell counts between 200/µL and 350/µL (n = 408) or standard WHO-recommended initiation at CD4+ cell counts of 200/µL or less (n = 408). Patient groups were comparable with regard to age, sex, body mass index, and CD4+ cell count at entry (median, 282/µL); median time of follow-up was 21 months. The trial was stopped early because of excess mortality in the standard treatment group. Standard treatment was associated with a statistically significant increased risk of death (23 events vs 6 events; hazard ratio, 4.0; \( P = .0011 \)) and a statistically significant increased risk of incident TB (36 events vs 18 events; hazard ratio, 2.0; \( P = .0125 \)). As with other findings indicating benefits of earlier initiation of antiretroviral therapy, it is difficult to say what impact these results will have on clinical practice when average CD4+ cell counts at the start of antiretroviral therapy remain well below 200/µL, according to the most recent data from most locales in the Caribbean (Figure 4). Public health initiatives need to be more aggressive in early identification of HIV infection and earlier initiation of treatment.

Surveys in 2005 and 2006 showed that there was a high general awareness of HIV disease across all countries, with 98% of respondents indicating that they had heard of HIV (World Bank, 2009). There was poorer understanding of the details of HIV disease. In Guyana, for example, 27% of respondents believed that HIV is transmitted by sharing utensils. In Trinidad, 69% knew the difference between HIV and AIDS. In the Organization of Eastern Caribbean States, only 27% of in-school youths and 44% of taxi drivers were able to reject major misconceptions about HIV transmission. In Haiti, less than 50% were aware that MTCT of HIV can be decreased with antiretroviral therapy.

**Successes and Challenges**

There have been successes in the battle against HIV disease in the Caribbean. UNAIDS data from 2005 to 2007 indicate that 96% of female sex workers in the Dominican Republic and 90% in Haiti reported using a condom during their last sexual contact with a client; rates were 89% in Guyana, 84% in Jamaica, 80% in Barbados, 68% in Surinam, and 56% in Cuba. With regard to screening of donated blood, data from 2006 and 2007 indicate that 100% of blood units were screened in a quality-assured manner in the vast majority of locales in the Caribbean, with the exception of Grenada and Antigua (UNAIDS, 2009). Other signs of progress include the following:

- In Jamaica, the prevalence of HIV infection has stabilized at 1.6%, and MTCT has decreased from 25% in 2000 to less than 5% in 2009 (Jamaica National HIV/STI Programme, UNGASS Country Progress Report, 2010).

- In the Bahamas, prevalence was estimated to remain at 3% in 2008, and MTCT decreased from 30% in 1997 to less than 1% since 2005 (The Commonwealth of The Bahamas National HIV/AIDS Centre, UNGASS Country Progress Report, 2010).

- In the Dominican Republic, prevalence decreased from 2.7% in 2001 to 1.1% in 2006.

- In Haiti, prevalence decreased from 6.2% in 1993 to 2.2% in 2006, and the number of patients receiving antiretroviral therapy increased from less than 300 in 2002 to greater than 26,000 in 2009.

Many challenges remain:

- There are many new HIV infections; the approximately 20,000 new infections in 2007 represent 2 new infections for every patient initiating antiretroviral therapy that year.

- Patients must be sought aggressively to initiate early antiretroviral therapy.

- Adherence to treatments (particularly among adolescents) must be monitored closely.

- HIV disease and TB programs must be integrated from the central level to the point of care, and MDR-TB must be monitored.

The HIV epidemic is far from over, and there is continuing need for more ev-

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**Figure 4.** CD4+ cell counts at initiation of antiretroviral therapy at various Caribbean locales. Based on data from the TCHARI (Trans-Caribbean HIV/AIDS Research Initiative) Network, 2010. IMIS indicates Institute of Infectious Diseases and Reproductive Health; INLR, National Institute Research Laboratory; MRF, Medical Research Foundation; PIH, Partners in Health.
idence-based interventions and sustained long-term commitment to address the numerous barriers to controlling the epidemic. Prevalence rates of HIV infection continue to be high in TB patients, patients with other sexually transmitted infections, the homeless population, sex workers, incarcerated persons, and substance users. Also, stigma and discrimination with regard to HIV infection must be overcome.

Haiti was devastated by the January 2010 earthquake, which is estimated to have killed more than 316,000 people and destroyed the infrastructure of the capital, Port-au-Prince. How the rate of HIV in Haiti may change as a result of the disruptions to the society and its health care delivery systems is difficult to predict (Koenig et al, HIV Ther, 2010). The challenge remains for the Haitian government to work with HIV care providers to continue HIV disease and AIDS treatment, care, and screening as the capital is rebuilt.

Lecture presented by Dr Pape in November 2009. First draft prepared from transcripts by Matthew Stenger. Reviewed and updated by Dr Daniel W. Fitzgerald in October 2010.

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Suggested Reading


