Public Health Classics

This section looks back to some ground-breaking contributions to public health, reproducing them in their original form and adding a commentary on their significance from a modern-day perspective. To complement the theme of this month's *Bulletin*, Thomas C. Quinn reviews the paper he co-authored in 1986 on AIDS in Africa. The original paper is reproduced by permission of the American Association for the Advancement of Science.

AIDS in Africa: a retrospective

Thomas C. Quinn[1]

In 1983, two years after the initial recognition of AIDS in the USA (*1, 2*), a series of investigations was initiated in central Africa to determine the extent of the clinical problem of AIDS and to examine its transmission patterns within the African region. These first investigations of AIDS in Africa were prompted by the finding of clinical AIDS cases among Africans residing in Europe, which differed from cases among Europeans by having a nearly equal male-to-female ratio and 90% had no identifiable risk factors (*3–6*). Two sentinel reports published one year later documented the presence of AIDS in selected urban centres of equatorial Africa (*7, 8*). Clinically, these cases were recognized by life-threatening enteropathic illnesses referred to as "slim disease," oesophageal candidiasis, Kaposi's sarcoma, and cryptococcal meningitis (*9–11*). Most of these studies on clinical cases suggested that while the disease may have been endemic in Africa, it did not become truly epidemic until the late 1970s and early 1980s, a pattern similar to that in the United States and Haiti.

The most unusual characteristics of AIDS among Africans were the equal distribution of cases between men and women and the high frequency of cases among commercial sex workers and their clients. In contrast to the industrialized world where the epidemic was entrenched among homosexual men and injecting drug users, there was little or no evidence for this pattern in Africa. This raised a series of debates regarding the modes of transmission in Africa, which ultimately was resolved following the introduction of serological tests for HIV-1, allowing for more detailed epidemiological studies on transmission, and investigations into the natural history and clinical presentation of HIV infections (*12–16*). Two years of detailed studies in Kinshasa, Zaire (now the Democratic Republic of the Congo) were presented in our paper entitled "AIDS in Africa: an epidemiologic paradigm" (*17*), which is reproduced in the following pages. From these early investigations in Kinshasa, it was evident by 1986 that HIV/AIDS was an escalating epidemic in central Africa with an estimated annual incidence of AIDS of 550–1000 cases per million adults, with 1–18% of healthy blood donors and pregnant women infected with HIV, and 27–88% of female commercial sex workers serologically positive for HIV. Our early estimate of HIV incidence in central and east Africa was 0.75% among the general population. In addition, we found that the male-to-female ratio of cases was 1:1 with age and sex-specific rates slightly greater in females <30 years of age and greater in males over age 40. It was evident that the epidemic was moving rapidly, being spread predominantly by heterosexual transmission, parenteral exposure to unscreened blood transfusions and unsterilized needles, and perinatally from infected mothers to newborns. The seeds for a massive epidemic had been sown and it was increasingly evident to clinicians and epidemiologists working in Africa that, unless a vigorous control programme was initiated in the region, the prevailing economic and cultural factors would favour these modes of transmission and the epidemic would extend to the entire continent.

Although we knew the problem was severe in 1986, none of us would have predicted the magnitude the epidemic would reach today. In 1986 we projected that the annual number of AIDS cases would be 400 000, whereas in 2000 there were three million (*18*). We estimated that 1–2 million Africans were HIV-infected in 1986, whereas today 25.3 million Africans are infected and the adult prevalence for the continent is now 8.8% (*18*). We estimated in 1986 that the annual incidence of infection was 0.75% among the general population, and today incidence rates range from 1.5% to 3% in rural populations, and from 5% to 15% among higher risk populations (*19*).

[1] Senior Investigator, National Institute of Allergy and Infectious Diseases, National Institutes of Health; and Professor of Medicine, Johns Hopkins University School of Medicine. Correspondence should be addressed to Dr Quinn at: Division of Infectious Diseases, The Johns Hopkins University, Ross Research Building 1159, 720 Rutland Avenue, Baltimore, MD 21205-2196, USA (email: tquinn@jhmi.edu).

Ref. No. **01-1601**

Overall, 3.8 million Africans became newly infected last year alone. Since the beginning of the epidemic, 5.7 million children have been infected with HIV, of whom 4.3 million have already died. In 2000, UNAIDS estimated that over 13 million children in Africa had been orphaned by the premature death of both parents due to AIDS (*18*).

Most of the epidemiological trends described in the original report continue today, with few exceptions. Throughout the region, men and women between the ages of 20 and 40 years, people with sexually transmitted diseases, and occupational groups such as long-distance truck drivers, military personnel, and female commercial sex workers have the highest infection rates (*20*). HIV prevalence of more than 80% has been reported for female sex workers in eastern, central, and southern Africa (*21*). Seroprevalence of HIV among pregnant women now ranges from 5% to 35%, with the highest rates among those in urban centres such as Abidjan, Blantyre, Kampala, and Lusaka. There are now 16 countries in which more than 10% of the adult population aged 15–49 years is infected with HIV (*21*). In seven countries in the southern cone of the continent, at least one in five adults is living with HIV. In Botswana a disturbing 36% of pregnant women are now infected with HIV, while in South Africa 22% are infected.

The initial clinical descriptions of immunosuppression with a selection of opportunistic infections and endemic diseases, including tuberculosis, and the modes of transmission have essentially remained unchanged since our original report. What has changed has been the overall magnitude and impact of the epidemic in sub-Saharan Africa. The human toll of this epidemic is becoming increasingly difficult to describe. Last year over 2.4 million people died from AIDS in Africa, resulting in a cumulative total of 17.2 million deaths from AIDS in the region (*18*). AIDS is now the leading cause of death, being responsible for 20% of all fatalities in the region. In addition to the personal suffering that accompanies HIV infection, the virus in sub-Saharan Africa threatens to devastate whole communities, reversing many decades of progress toward a healthy and more prosperous future. Because AIDS deaths are concentrated in childhood and young adulthood, their effects are substantial. Within the next ten years, 8–31 years of average life expectancy will have been lost in those countries most affected by HIV/AIDS in sub-Saharan Africa (*21*). These additional HIV/AIDS cases place increasing strain on the health care systems that are already overburdened, and on individual households that are trying to manage with limited economic resources (*22*). Care and support for AIDS orphans is a growing concern throughout the region. Thus, it was an understatement to say in 1986 that the impact of AIDS socially, economically, and demographically would be enormous: because of its widely destabilizing effects superimposed on an already fragile and complex geopolitical system, AIDS has become a key issue for human security in sub-Saharan Africa. Within the last two years the world's attention has been directed to this growing problem of AIDS in Africa, ushering in increasing resources for improved prevention programmes and, hopefully, for antiretroviral care for people already infected.

It was evident in 1986, as it is now, that to respond to the AIDS epidemic an effective plan of action had to be developed, which was initiated under the auspices of the World Health Organization Regional Office for Africa (*17*). The ultimate goal of these strategies was to lead rapidly to the development of programmes to halt the spread of the AIDS virus. Creative educational approaches, changes in medical practice, the screening of women of childbearing age, and counselling regarding contraception were hoped to be effective in stemming the tide of the epidemic. It was felt that these activities had to be integrated into existing health and educational programmes in order to be successful and that they would require full support by appropriate government agencies. However, to support really effective intervention and control, international commitment would be required in the form of financial aid and scientific, educational, and technical assistance. Only history will judge whether the international commitment was strong enough to slow the epidemic, and I leave readers to make their own assessment of the response to the problem between 1986 and 2001.

It is of interest that two of the co-authors of this paper, the late Jonathan Mann and Peter Piot, rose to the challenge of trying to spearhead worldwide control of the AIDS epidemic. Jonathan Mann became the first Director of the WHO Global Programme on AIDS and, later, Peter Piot became the Executive Director of UNAIDS. Their tasks have been formidable, as the HIV/AIDS epidemic has marched relentlessly throughout the sub-Saharan African region and many other areas of the world. However, there are some glimmers of hope on the horizon which might stem the tide of the epidemic. Uganda was one of the first countries in Africa to recognize the danger of HIV to national development, and the government took steps to fight its spread through action by political and religious leaders and community development organizations. This broad-based approach to the epidemic contributed to a reduction in HIV infection among young, pregnant women living in towns and cities (*18, 21*). Condom use is increasing among young people, but unfortunately these changes are limited and are taking place against a backdrop of very high prevalence that limits their overall effectiveness.

The introduction of nevirapine in Uganda and other African countries to prevent mother-to-infant transmission has the potential to slow dramatically the spread of HIV among newborn infants (*23*). Unfortunately, enormous obstacles still exist in terms of an inadequate clinical infrastructure, limited counselling and testing of all pregnant women, and few or no drug delivery programmes, though changes

are occurring. With recent reductions in the price of antiretroviral drugs for Africa — and with the development of the Global Fund for AIDS, Tuberculosis, and Malaria — there is renewed optimism that antiretroviral drugs may soon be made available to those afflicted with AIDS. Unfortunately, while the developed world shares in the benefits of these drugs in terms of increased survival, decreased mortality, and decreased hospitalizations, fewer than 1% of AIDS patients in Africa have access to antiretroviral therapy.

In a sense, it is a sad commentary that the conclusions and recommendations that can be made today are in fact similar to those we made in 1986. What has changed is that the epidemic is now much worse, millions more have died or have been orphaned, and the effects of the epidemic are even more profound in African communities. In retrospect, if we thought the AIDS epidemic had reached a crisis in 1986, then it is now a medical emergency of unprecedented proportions that threatens the social, economic, and cultural framework of Africa. Such an epidemic requires immediate and unprecedented international assistance to support effective interventions to prevent transmission and to provide financial resources for care of those already infected and suffering from AIDS. ■

References

1. **Centers for Disease Control and Prevention.** Pneumocystis pneumonia — Los Angeles. *Morbidity and Mortality Weekly Report*, 1981, **30**: 250–252.
2. **Centers for Disease Control and Prevention.** Kaposi's sarcoma and Pneumocystis pneumonia among homosexual men — New York City and California. *Morbidity and Mortality Weekly Report,* 1981, **30**: 305–308.
3. **Offenstadt G et al.** Multiple opportunistic infection due to AIDS in a previously healthy black woman from Zaire. *New England Journal of Medicine*, 1983, **308**: 775.
4. **Clumeck N et al.** Acquired immune deficiency syndrome in Black Africans. *The Lancet*, 1983, **1**: 642.
5. **Taelman H et al.** Acquired immune deficiency syndrome in 3 patients from Zaire. *Annals de la Société belge de Médecine tropicale,* 1983, **63**: 73–74
6. **Clumeck N et al.** Acquired immunodeficiency syndrome in African patients. *New England Journal of Medicine,* 1984, **310**: 492–497.
7. **Piot P et al.** Acquired immunodeficiency syndrome in a heterosexual population in Zaire. *The Lancet,* 1984, **2**: 65–69.
8. **Van de Perre P et al.** Acquired immunodeficiency syndrome in Rwanda. *The Lancet,* 1984, **2**: 62–65.
9. **Vandepitte J et al.** AIDS and cryptococcosis (Zaire, 1977). *The Lancet,* 1983, **1**: 925–926.
10. **Serwadda D et al.** Slim disease: a new disease in Uganda and its association with HTLV-III infection. *The Lancet*, 1985, **2**: 849–852.
11. **Katlama C et al.** Acquired immunodeficiency syndrome (AIDS) in Africans. *Annals de la Société belge de Médecine tropicale,* 1984, **64**: 379–389.
12. **Brun-Vezinet F et al.** Prevalence of antibodies to lymphadenopathy-associated retrovirus in African patients with AIDS. *Science,* 1984, **226**: 453–456.
13. **Wendler I et al.** Seroepidemiology of human immunodeficiency virus in Africa. *British Medical Journal*, 1986, **293**: 782–785.
14. **Mann JM et al.** Natural history of human immunodeficiency virus infection in Zaire. *The Lancet*, 1986, **2**: 707–709.
15. **Mann JM et al.** Surveillance for AIDS in a central African city. Kinshasa, Zaire. *JAMA*, 1986, **255**: 3255–3259.
16. **Van de Perre P et al.** Female prostitutes: a risk group for infection with human T-cell lymphotropic virus type III. *The Lancet*, 1985, **2**: 524–527.
17. **Quinn TC et al.** AIDS in Africa: an epidemiologic paradigm. *Science,* 1986, **234**: 955–963.
18. **UNAIDS/WHO.** *AIDS epidemic update: December 2000.* Geneva, Joint United Nations Programme on HIV/AIDS and World Health Organization, 2000.
19. **UNAIDS.** *Report on the global HIV/AIDS epidemic. June 2000.* Geneva, Joint United Nations Programme on HIV/AIDS, 2000.
20. **Quinn TC.** Global burden of the HIV pandemic. *The Lancet*, 1996, **348**: 99–106.
21. **UNAIDS.** *AIDS in Africa: country by country.* Geneva, Joint United Nations Programme on HIV/AIDS and Economic Commission for Africa, 2000 (Africa Development Forum 2000. AIDS: the Greatest Leadership Challenge).
22. **UNAIDS.** *The business response to HIV/AIDS: impact and lessons learned, 2000.* Geneva and London, Joint United Nations Programme on HIV/AIDS, 2000 (The Prince of Wales Business Leader Forum and The Global Business Council on HIV & AIDS).
23. **Guay LA et al.** Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial. *The Lancet,* 1999, **354**: 795–802.