

Examining the hypothesis that sexual transmission drives Africa's HIV epidemic

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The belief that sex is the primary mode of human immunodeficiency virus (HIV) transmission in sub-Saharan Africa is an assertion so widely accepted and has remained unquestioned for so long that it has taken on the status of a received truth.

The World Health Organization (WHO) and the Joint U.N. Programme on HIV/AIDS (UNAIDS) recently convened an expert consultation to review issues raised in a series of papers published in the *International Journal of STD & AIDS* (1-4) that questioned the validity of that assertion. After examining the papers, WHO and UNAIDS issued a press release announcing that "the vast majority of evidence [supports the view] that unsafe sexual practices continue to be responsible for the overwhelming majority of infections" (5). As co-authors of the controversial articles (1-4), and as participants in the Geneva meeting (three of us), we state that WHO's conclusion is premature. It is neither based on those discussions, nor on a more considered review of the relevant literature.

In our articles we have pointed out that anomalies in the evidence, and failure to demonstrate an overwhelming role for heterosexual transmission from available data, create a gap that requires evaluation. We have also noted that most studies on HIV in Africa that have assessed the risks associated with health care exposures such as medical injections, transfusions, and scarifications, have reported substantial relative risks and (depending on the proportion exposed) corresponding crude attributable risks. The breadth and depth of evidence undermining the dominant paradigm calls for a review of the issue.

The assertion that heterosexual transmission accounts for over 90% of HIV in African adults lacks supporting empirical evidence linking HIV to sexual behaviors. The evidence WHO/UNAIDS uses to buttress the heterosexual paradigm is mostly indirect and circumstantial, and much of it seems aimed at debunking the role of health care rather than substantiating the role of heterosexual contact. For example, the press release asserts, "children between 5 and 14 years, who are generally not sexually active yet, have very low infection rates." In fact, few surveys have screened for HIV in African children, and some (but not all) have reported substantial HIV prevalence. For example, 4.2% among urban children 6-15 years old in Rwanda in 1986 (6) and 5.6% among 2-14 year old children in a national survey in South Africa in 2002 (7). These rates, which are much higher than could be expected from vertical transmission, point to other means of transmission, possibly health care transmission. It should be noted that observed rates are not likely due to substandard tests (Rwandan cases were confirmed by Western blot, and tests used in South Africa have

over 99% specificity) or to child sexual abuse or early sexual activity (8).

According to WHO/UNAIDS, HIV behaves like other sexually transmitted diseases (STD), and populations with high HIV prevalence (prostitutes, long-distance truck drivers, soldiers, and migrant workers) suggest sex as the principal risk. Such arguments are inferential, indirect and ignore conflicting epidemiologic observations. For example, in Zimbabwe during the 1990s, STD and HIV followed opposite epidemic trajectories (2).

Without attention to parenteral exposures, observations linking sexual activity to HIV infections are inconclusive. For example, sexually active populations, especially including prostitutes and their customers, are at risk for STD, which is commonly treated throughout Africa by injections in formal or informal health care settings. Recent estimates from WHO suggest that 17-50% or more of injections in Africa may reuse equipment without sterilization (9, 10). As a consequence, the risk of HIV infection in STD clinics, where background HIV prevalence among patients is often high, may be considerable. Medical procedures during pregnancy, including drawing venous blood for syphilis tests, multiple tetanus vaccinations, and gamma globulin shots, add another set of potential health care risks. When health care is unsafe, HIV case distribution may reflect sexual activity circumstantially rather than causally. Studies that sort out this potential source of confounding are rare. Furthermore, there has been no consideration of the potential multiplier effect that may result from interaction between sexual and health care transmission in Africa.

The WHO/UNAIDS press release states, "there is no consistent association between higher HIV rates and lower injection safety standards." We are unaware of any studies that have systematically examined this correlation; we would welcome them. Specifically, we encourage studies to determine the frequency of health care exposures and level of infection control standards in different countries with generalized epidemics. This may require monitoring contamination of equipment ready for use, testing mothers of children with AIDS to see if any are HIV-negative, investigating clinics and hospitals suspected as the source of iatrogenic HIV infections, etc.

The press release claims that "modeling of the epidemic with the best available information also shows that the overwhelming majority of infections are due to unsafe sex" (5). The accuracy of models depends crucially on their assumptions and on the quality of the data used to estimate parameters (11); indeed, models have often been used to justify orthodoxy by using estimates for key parameters that are at considerable odds with empiric evidence (3). For example, models purporting to describe heterosexual HIV transmission in Africa have supposed ulcerative STDs to amplify transmission risk by as much as 100 times (12, 13).

Finally, the idea that penile-vaginal sex is driving HIV epidemics in Africa is a hypothesis (3) that requires renewed scrutiny, not defensiveness. Studies seeking properly controlled empiric evidence need to be conducted to support or oppose this hypothesis. In our view, the published evidence suggests that: (a) two decades into the epidemic, such studies have yet to be done; (b) the heterosexual hypothesis is inadequate to explain fully the observed epidemic trajectories, especially in regions of intense transmission; and (c) irrespective of the precise proportions of HIV attributable to sexual activity or to unsafe health care, priority should be given to assuring safe health care in formal and informal medical settings world-wide, if only as a human rights issue (14).

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