Published in final edited form as:

J Acquir Immune Defic Syndr. 2010 July 1; 54(Suppl 1): S5–S6. doi:10.1097/QAI.0b013e3181e243a1.

Epidemiology of HIV Infection and Risk in Adolescents and Youth

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Abstract

Adolescents and youth ages 15–24 are one of the populations most impacted by the global HIV epidemic with an estimated 50% of new infections occurring in this age group. They are thus one of the prime populations for targeting behavioral and biomedical preventions. However, the dynamics of the HIV epidemic in youth vary widely by geographic region as well as risk behavior profiles. There are also biological and neurodevelopmental considerations that must be considered in the development, testing and ultimate dissemination of HIV prevention interventions. These concepts are broadly discussed here.

Keywords

HIV/AIDS; Epidemiology; Adolescents

INTRODUCTION

It is widely known that adolescents and young adults are at or near the epicenter of the global HIV epidemic across almost all geographic risk profiles and locations. This article is meant to highlight some of the features of the global HIV epidemic in youth and set the background for discussions of prevention interventions targeting this population.

Characteristics of various global regions or risk profiles among youth that will impact development, testing and ultimately dissemination of HIV prevention interventions will be described.

The definition of adolescence varies depending on the organization and the type of report being produced. For example, the Centers for Disease Control and Prevention often refer to adolescents (10–19) and young adults (20–24) when discussing this transition period between childhood and adulthood¹. The World Health Organization often refers to young

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This paper was based on a presentation made at the Consultation for the Inclusion of Adolescents in Biomedical HIV Prevention Clinical Trials, June 17–19, 2009, Washington, DC.

people and includes individuals from 10 to 24 years of age²⁻³. While this grouping is convenient for epidemiological purposes, there clearly are developmental, biological and legal reasons for segmenting these populations when considering development of behavioral or biomedical prevention interventions and their testing. These types of issues will be discussed by other authors in appropriate sections of this collection.

As of 2007, there were 1.2 billion young people aged 15–24 in the world with an estimated 10 million living with HIV. Current estimations by UNAIDS suggest that more than 1 million new HIV infections occur in the 15–24 age group each year, representing over 40 % of worldwide new infections⁴. Of the 15–24 year olds living with HIV, 63 per cent live in sub-Saharan Africa and 21 per cent live in Asia-Pacific. In Eastern Europe and Central Asia, more than 80 per cent of those living with HIV are under the age of 30. Sub-Saharan Africa contains almost two thirds of all young people living with HIV/AIDS (6.2 million) with 76% of them being female⁴.

EPIDEMIC BY RISK BEHAVIORS

Different risk behaviors are driving the epidemic depending on the area of the world under consideration. However, a common theme throughout the differing epidemics in different parts of the world are the impact of individual-level risks as the core factors determining transmission and the many social network, community and public policy factors potentially impacting these individual-level risks. An example of the listing of these various levels of risk that make up an ecological model for Southern Africa is shown in Table 1.

Heterosexual transmission is driving the epidemic in Africa, especially affecting young women of child-bearing age. For adolescent **females** the risk of HIV acquisition is directly related to the age and risk profile of their partners. Thus, in areas where **heterosexual transmission** propels the local epidemic as in sub-Saharan Africa, females are becoming infected at younger ages than males through exposure to older males. Data from several surveys from South Africa clearly illustrate such trends⁵⁻⁷. Recently, concurrency⁸ and circumcision⁹ have been discussed as key elements driving the heterosexual HIV epidemic in sub-Saharan Africa but other factors must be considered as prevention strategies are being designed, tested and ultimately disseminated. As in sub-Saharan Africa, in other areas such as the Caribbean, Guyana, and some Central American countries, heterosexual transmission is a dominant mode of transmission and similar patterns of acquisition are seen⁴. In general, in these areas where heterosexual transmission of HIV is predominant, **males** are becoming infected at slightly higher ages than females and at lower rates. This is attributed to males having either younger or more similar aged female partners at coital debut⁶⁻⁷.

The HIV epidemics in North and Latin America, Central and Western Europe and Oceania are predominantly MSM driven epidemics^{4, 10-12}. There is evidence in the US that the HIV epidemic among young MSM, particularly ethnic minorities, is the most rapidly expanding segment of the overall US epidemic¹³⁻¹⁵. Similarly there is evidence in many other regions of an expanding MSM epidemic even in the setting of decreasing overall HIV rates^{4, 10, 16-18}. The individual-level risk for MSM is unprotected anal intercourse, particularly anal receptive intercourse. Within the MSM population, transgender youth have particularly high rates of HIV incidence. The ecological context for the MSM HIV epidemic in many areas is particularly confounded and challenged by policy and community factors, i.e. homosexuality is illegal, highly stigmatized or not even recognized as a phenomenon¹⁹. It is not surprising then that data on MSM, particularly young MSM, are lacking in many geographical settings. Similarly the interplay of MSM and heterosexual HIV transmission are not clear in most settings.

HIV transmission to youth from intravenous drug use (IVDU) is the predominant mode of acquisition in most Eastern European and some Asian settings²⁰. While IVDU transmission does occur in many other settings it is usually in an older population. IVDU is quite commonly the initial recreational drug exposure in Eastern Europe leading to this epidemic among youth 20–21.

As scientists research and eventually implement HIV prevention programs, it is important not only to consider the differences based on location, but also differences across different neurodevelopmental strata of youth. Neurocognitive differences between early adolescence (ages 11–14), middle adolescence (ages 15–17), late adolescence (ages 18–21) and youth (ages 21–24) must be taken into account when evaluating potential interventions. Other biological changes with pubertal development including changes in body mass, immune function and sexual maturation will have significant effect on the efficacy and safety of specific interventions and should be evaluated during development and considered during ultimate deployment of biomedical interventions.

This overview of HIV epidemiology among youth is meant to establish the context for a discussion of prevention interventions targeting youth. These data will need to be updated and refined as this epidemic evolves in its many settings. Further, the more dissected ecology of the local HIV epidemic will need to be considered for testing prevention interventions and will be crucial for ultimate dissemination of the multifaceted interventions it will take to impact the global HIV epidemic.

Acknowledgments

Sources of Support: The development of this paper was not supported by any public or private funding sources.

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Table 1

Ecological Risk Model for HIV Infection in Southern Africa

■	Individual Level: Condom use, circumcision, HSV-2/GUD, viral load, acute infection, age of coital debut, marriage, ARV status
■	Network Level: intimate partner violence, STI prevalence, labor migration, condom use, concurrent partnerships
■	Community Level: autonomy of women and girls, civil conflict, stigma, mobility, VCT access, sexual norms and beliefs, ARV access
■	Public Policy Level: human rights contexts, the condom gap, sexual health education