

# Epidemiology of HIV and AIDS Among Adolescents: Current Status, Inequities, and Data Gaps

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## INTRODUCTION

**Objectives:** To examine levels and patterns of HIV prevalence, knowledge, sexual behavior, and coverage of selected HIV services among adolescents aged 10–19 years and highlight data gaps and challenges.

**Methods:** Data were reviewed from Joint United Nations Programme on HIV/AIDS HIV estimates, nationally representative household surveys, behavioral surveillance surveys, and published literature.

**Results:** A number of gaps exist for adolescent-specific HIV-related data; however, important implications for programming can be drawn. Eighty-two percent of the estimated 2.1 million adolescents aged 10–19 years living with HIV in 2012 were in sub-Saharan Africa, and the majority of these (58%) were females. Comprehensive accurate knowledge about HIV, condom use, HIV testing, and antiretroviral treatment coverage remain low in most countries. Early sexual debut (sex before 15 years of age) is more common among adolescent girls than boys in low- and middle-income countries, consistent with early marriage and early childbirth in these countries. In low and concentrated epidemic countries, HIV prevalence is highest among key populations.

**Conclusions:** Although the available HIV-related data on adolescents are limited, increased HIV vulnerability in the second decade of life is evident in the data. Improving data gathering, analysis, and reporting systems specific to adolescents is essential to monitoring progress and improving health outcomes for adolescents. More systematic and better quality disaggregated data are needed to understand differences by sex, age, geography, and socioeconomic factors and to address equity and human rights obligations, especially for key populations.

**Key Words:** HIV, AIDS, adolescents, prevention, care, treatment

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This article focuses on adolescents, defined as aged 10–19 years.<sup>1</sup> Adolescence is the period when many people begin to explore their sexuality; as a result, access to sexual and reproductive health information and services becomes increasingly important. Despite the well-known need for protection from HIV infections and other reproductive health risks, their age and their social and economic status limit adolescent access to information and services in many settings. Adolescence is typically a period of experimentation, new experiences, and vulnerability. Some adolescents may experiment with injecting drugs, sexuality, and sexual orientation (men may begin to have unprotected sex with other men), and some are exploited sexually. Millions of adolescents who are becoming sexually active live in countries with a high burden of HIV. Adolescence provides a window of opportunity in which to intervene early. Comprehensive data are essential to shaping accurate HIV-related messages and services before risky behaviors are formed and become entrenched.

Since 2000, various global declarations and commitments, with specific goals and targets, have been made and set by world leaders and governments to respond to the HIV and AIDS epidemic. Most are general in nature; however, the United Nations General Assembly Special Session on HIV and AIDS (UNGASS) in 2001 specifically included a target to reduce the prevalence of HIV in young people aged 15–24 years globally by 25% by the end of 2010 and to increase young people's access to essential HIV prevention information, skills, and services so as to reach 95% of those in need by the same date.<sup>2</sup>

More recently, for the countdown to 2015, the UN Secretary General's High-Level Advisory Panel on the Post Millennium Development Goals Agenda released recommendations for post-2015.<sup>3</sup> The report emphasizes equity, empowerment, and engagement of adolescents and youth and strengthening of data as core drivers of transformation in the next development agenda.

Although these global commitments, goals, and targets are relevant for adolescents, the implications and accountabilities are rarely specific to this age group. In addition, adolescent-specific data are limited, which present a serious impediment to measuring and monitoring progress. Although the international reporting process recommends reporting on disaggregated data on adolescents and youth, little of these data are collected or published in global or national progress reports.<sup>4</sup> As a result, compared with infants and adults, less is known about the burden of HIV and AIDS among

adolescents and progress to date in addressing their needs for HIV prevention, care, and treatment services. To address this gap, this article provides an overview of the global epidemiology of HIV and AIDS among adolescents and examines progress in their access to key selected, HIV-related high-impact interventions that reduce HIV risk, morbidity, and mortality. The article also highlights some of the remaining challenges in data availability and monitoring of the HIV response among adolescents and proposes some areas for further development.

**METHODS**

Epidemiological HIV and AIDS data on the burden of disease and prevalence in adolescents at global and regional levels were derived from the 2012 Joint United Nations Programme on HIV/AIDS (UNAIDS) HIV and AIDS estimates and reanalysis by United Nations Children’s Fund.<sup>1,5</sup> In addition, HIV prevalence data from national population-based surveys in selected countries in which HIV testing had been included<sup>6–10</sup> were used to assess differentials by age and sex.

Data on adolescent HIV knowledge and sexual behavior for selected indicators—knowledge about HIV, HIV testing uptake, sexual debut before 15 years of age, multiple sexual partners, and condom use among those with multiple partners—were drawn from nationally representative population-based surveys, such as the Multiple Indicator Cluster Surveys<sup>11</sup> and the Demographic and Health Surveys,<sup>6</sup> or other nationally representative surveys. These surveys have standardized methods and instruments to ensure that data are comparable between survey rounds and across countries.

Data on adolescent key populations, such as young men who have sex with men (MSM), sexually exploited children, and adolescents who inject drugs, were mainly drawn from the UNAIDS 2013 Global AIDS Report,<sup>5</sup> supplemented with various special targeted studies, including the published literature.

Where applicable, knowledge and behavior indicators were analyzed to assess levels of coverage and disparities by selected characteristics—age, sex, rural and urban residence,

education, and household economic status. Trend analysis is described for relevant indicators in countries where repeat surveys have been conducted in the last 5–10 years.

**RESULTS**

**Burden of HIV and AIDS in Adolescents**

Globally, an estimated 35.3 million people were living with HIV at the end of 2012; of these, 2.1 million were adolescents aged 10–19 years, of which the majority was girls (56%).<sup>12</sup> The gender disparity has persisted over time, with this number remaining largely unchanged over the past 5 years. These estimates include both adolescents who acquired HIV through mother-to-child transmission (perinatal and postnatal transmission through breast-feeding) and who acquired HIV behaviorally through unprotected sex or by sharing nonsterile injecting equipment.

The majority of HIV infections are in sub-Saharan Africa, where 85% of all adolescents living with HIV were located in 2012 (1.7 million) (Table 1). About 1.3 million adolescents living with HIV in sub-Saharan Africa were in Eastern and Southern Africa and 390,000 in the West and Central Africa. Outside sub-Saharan Africa, South Asia had the highest number of adolescents living with HIV (130,000), accounting for 6% of the global burden of HIV among adolescents, followed by East Asia and the Pacific (110,000), Latin America and the Caribbean (81,000), Eastern Europe and Central Asia (22,000), and the Middle East and North Africa (17,000).

**New HIV Infections Among Adolescents**

About 300,000 new infections occurred among adolescents aged 15–19 years in 2012, which accounted for about 13% of the 2.3 million new infections globally in 2012 (about 830 adolescents were infected with HIV everyday of 2012).<sup>12</sup> However, global aggregate data on the epidemic in adolescents, and youth in particular, mask significant regional and population differences. In 2012, approximately two-thirds of all new HIV infections in adolescents were among girls, mainly in

**TABLE 1.** Estimated Number of Adolescents Aged 10–19 years Living With HIV by United Nations Children’s Fund Regions, 2012

	Estimated Number of Adolescents Living With HIV, 2012			
	Total Aged 10–19 yrs	Females Aged 10–19 yrs	Males Aged 10–19 yrs	Female, %
Sub-Saharan Africa	1,700,000	1,000,000	720,000	58
Eastern and Southern Africa	1,300,000	800,000	550,000	59
West and Central Africa	390,000	220,000	170,000	56
Middle East and North Africa	17,000	9100	8300	52
South Asia	130,000	62,000	64,000	49
East Asia and the Pacific	110,000	55,000	53,000	51
Latin America and the Caribbean	81,000	35,000	46,000	43
Central and Eastern Europe and the Commonwealth of the Independent States	22,000	11,000	11,000	52
Global	2,100,000	1,200,000	930,000	56

Source: United Nations Children’s Fund analysis of unpublished UNAIDS 2012 HIV and AIDS estimates.

sub-Saharan Africa.<sup>1</sup> In some countries in this region, more than 80% of the adolescents newly infected with HIV in 2012 were adolescent girls—South Africa (82% female), Sierra Leone (85% female), Gabon (89% female), etc.<sup>12</sup>

### HIV Prevalence Among Adolescents in Generalized Epidemics

In generalized epidemic countries with data, HIV prevalence among adolescent females tends to be considerably higher than among adolescent males, suggesting that context heightens adolescent girls' sexual risks and vulnerabilities (Fig. 1). Most of the countries with the highest HIV prevalence rates in the world are in Southern Africa. Age-specific prevalence data show a clear sex disparity in HIV prevalence by the age of 15 years. For example, in Swaziland where adult prevalence is estimated to be the highest in the world at over 26% in 2012,<sup>5</sup> a 2006–2007 survey found that HIV prevalence in adolescents aged 10–14 years is low and similar to that of young children, but prevalence begins to increase in adolescent girls aged 15–19 years where it is 5 times as high as in boys of the same age. Nearly 40% of young women are HIV positive by the age of 20–24 years, rising to nearly 50% by the age of 25–29 years<sup>7</sup> (Fig. 1).

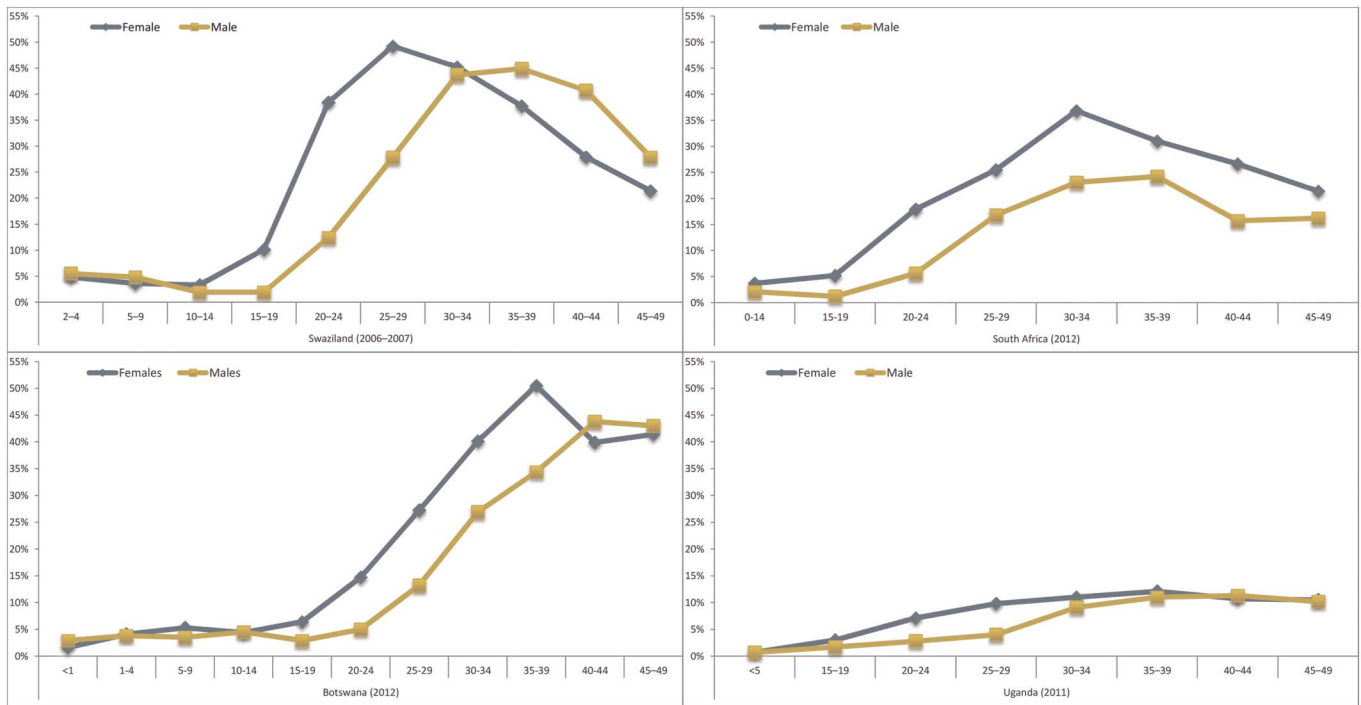
In a range of relatively high HIV burden countries in Africa, such as Botswana, South Africa, and Uganda, a similar and worrying trend is evident, with low HIV prevalence in

early childhood for both sexes, which shifts with entry into adolescence accompanied by increased prevalence among females compared with males. The gap continues to widen between the sexes during adolescence into young adulthood.<sup>8,9</sup> HIV prevalence in Uganda is nearly double in adolescent girls aged 15–19 years (3.0%) compared with boys of the same age (1.7%)<sup>10</sup> (Fig. 1).

### HIV Prevalence Among Adolescents in Low and Concentrated HIV Epidemic Settings

The limited studies available from low and concentrated epidemic countries suggest that HIV prevalence is disproportionately high among adolescents belonging to “key populations,” especially adolescent MSM, adolescents who inject drugs, and adolescents who are exploited sexually. These adolescents also face high levels of stigma, which can prevent their access to support and key services for prevention of HIV infection.

In Ukraine where HIV prevalence was 0.9% among people between 15 and 49 years old in 2012, and is among the highest in the Eastern and Central Europe, the prevalence among young people who inject drugs (PWID), younger than 25 years in Kiev, has been reported at 7.1%. Prevalence among MSM and sex workers younger than 25 years in Kiev was 4.2% and 3.0%, respectively.<sup>5</sup> Similarly, in the Russian Federation, although HIV prevalence in the general population was



Source: Swaziland Demographic and Health Survey (DHS), 2006–2007; South African National HIV Prevalence, Incidence, Behaviour, and Communication Survey, 2012; Botswana AIDS Impact Survey, 2012, Preliminary Report; Uganda DHS, 2011.

**FIGURE 1.** HIV prevalence by age group in Swaziland (2006–2007), South African (2012), Botswana (2012), and Uganda (2011).

estimated at 1% in 2012, the prevalence among injecting drug users (IDU) younger than 25 years in Moscow was estimated at 12%. HIV prevalence among MSM and sex workers younger than 25 years in Moscow was reported at 10.8% and 4.1%, respectively.<sup>5</sup>

Local studies in Asia show that HIV transmission resulting from sexual exploitation and commercial sex has been relatively contained, although pockets of concern persist.<sup>13</sup> Although these studies are not limited to adolescents, HIV transmission from unprotected sex between males seems to be a key driver of the epidemics in several countries. HIV prevalence exceeding 10% has been found in cities in China,<sup>14</sup> India,<sup>15</sup> Thailand,<sup>16</sup> and Vietnam.<sup>17</sup>

In most Latin American countries, the estimated HIV prevalence in the general population is below 1%. However, it is reported to be as high in major urban areas among MSM younger than 25 years, eg, 13% in Paraguay, 12% in Mexico, 10.5% in Peru, 9.5% in Colombia, 9% in Argentina, and more than 5% in several other countries in the region.<sup>5</sup>

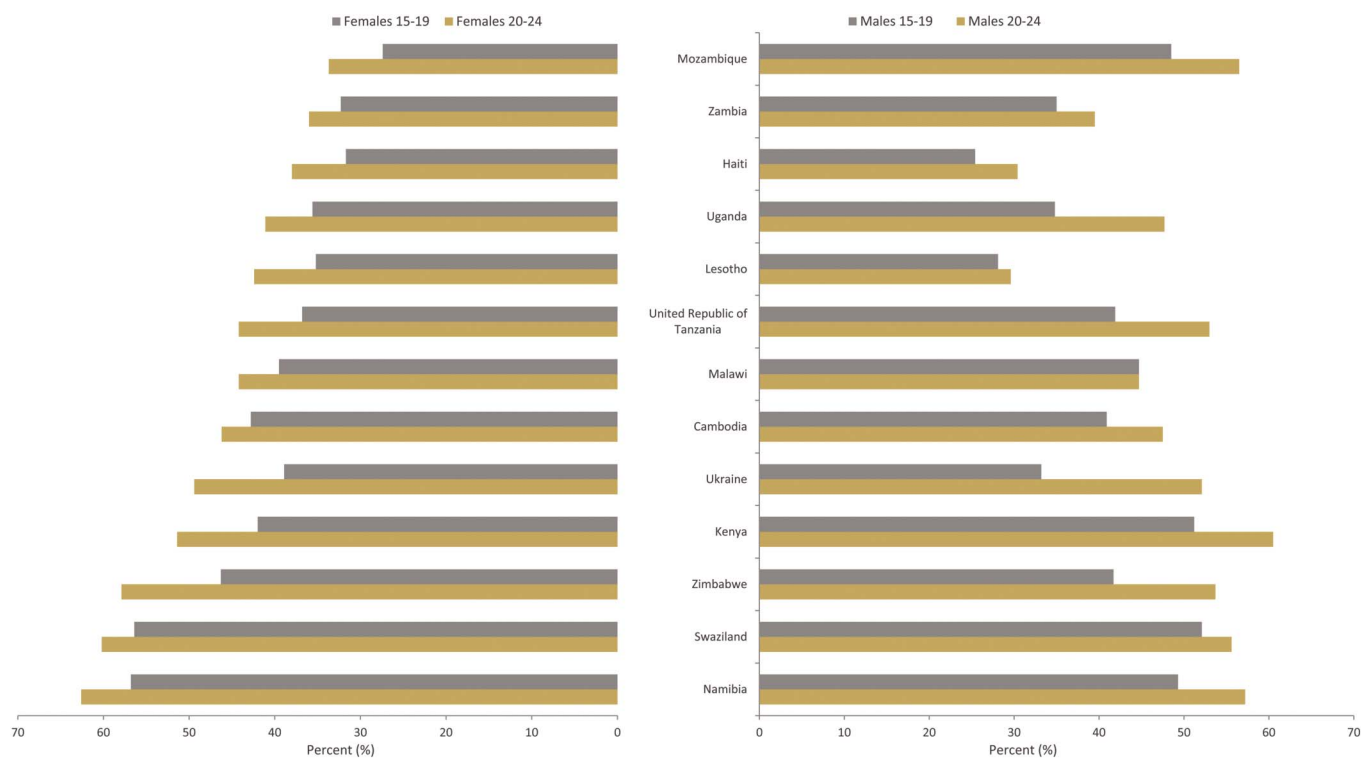
Although IDU behaviors do not seem to be highly prevalent among adolescents, the risks are extremely high for those who do inject.<sup>18</sup> There are also concerns about increasing levels of use in some parts of the world. In a 2012 survey in Myanmar, HIV prevalence was 7% among 15- to 19-year olds who injected drugs and more than double that (15%) among 20- to 24-year olds.<sup>19</sup> Studies suggest that injecting drug use

accounts for more than two-thirds of all new infections in Iran, 40% of new infections in Eastern Europe, and more than one-third in Philippines.<sup>5</sup> In Pakistan, where IDU is a key driver of the epidemic, studies indicate that HIV prevalence among PWID more than tripled, from 11% in 2005 to 38% in 2011.<sup>20</sup>

### HIV Knowledge

The overwhelming majority of new HIV infections are transmitted through sex. A basic understanding of HIV and how it spreads is a necessary component of prevention, although this is not sufficient to change behavior and reduce risk. Despite consistent calls for improving knowledge, in general, levels of knowledge of HIV among adolescents and young adults are appallingly low, especially in the worst-affected countries.

Recent surveys in countries with generalized epidemics show that, in most of these countries, less than half of adolescent boys and girls, aged 15–19 years, have a basic understanding of HIV (Fig. 2). This falls far short of the 95% target agreed in 2001 at the UNGASS. Consistent with the higher rates of HIV among girls in the most affected regions, girls tend to have worse knowledge levels than boys of the same age. In sub-Saharan Africa, only 26% of adolescent girls aged 15–19 years and 36% of adolescent boys of the same age have a comprehensive and correct knowledge of



Source: United Nations Children's Fund global databases, 2013, based on Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and other national surveys, 2006–2012.

**FIGURE 2.** Percentage of adolescents aged 15–19 years and young women and men aged 20–24 years with comprehensive correct knowledge of HIV, by country, sex, and age in selected countries, 2007–2012.

HIV.<sup>1</sup> Disparities in knowledge about HIV prevention among adolescent girls and boys are linked to gender, education, household wealth, and place of residence.<sup>21</sup> Adolescent girls and boys in poor households and living in rural areas are less likely to have comprehensive knowledge about HIV and AIDS. These differences persist in nearly all countries with available data.<sup>21</sup> Global and regional averages can mask individual country progress. Several countries show evidence of improved knowledge about HIV prevention. Between 2000 and 2012, Belarus, Guyana, Jamaica, Namibia, Rwanda, Serbia, Swaziland, Trinidad and Tobago, Vietnam, and Zimbabwe witnessed remarkable increases in knowledge about HIV prevention to levels above 50% or more among adolescent girls, and there were similar increases among adolescent boys in Rwanda and Namibia.<sup>21</sup>

### Sexual Debut

Early sexual debut (before 15 years of age) provides more opportunities over time for adolescents to be exposed to HIV, especially where higher risk partners or multiple partners are involved and condom use is less likely. The lack of awareness and other social pressures and power imbalances can also conspire to put the health of adolescents at risk.

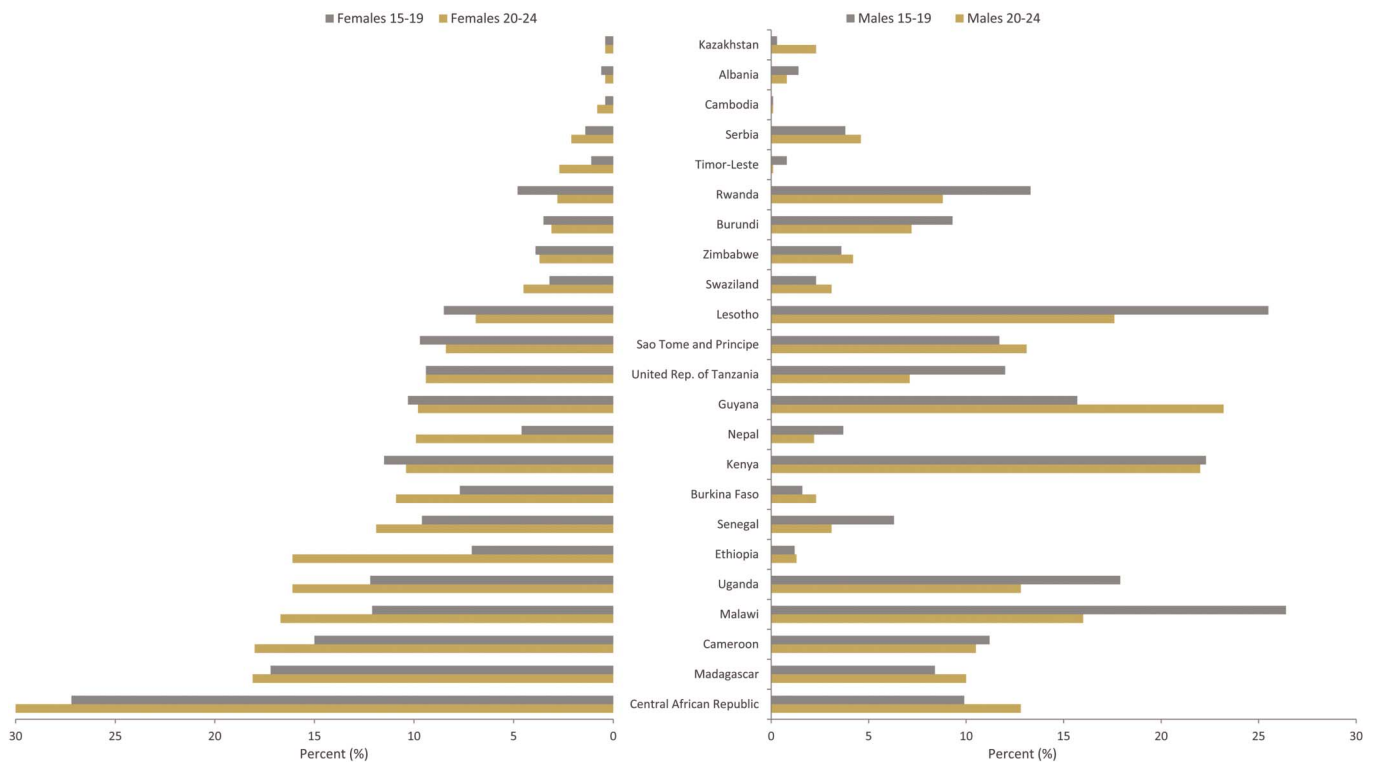
Among adolescent girls, aged 15–19 years, in sub-Saharan Africa, a higher percentage of girls (13%) than boys (9%) had sex before the age of 15 years. This pattern was

observed in most regions with sufficient data. In West and Central Africa, 16% of girls had sex before the age of 15 years compared with 7% of boys, and in South Asia, 8% and 3% of girls and boys, respectively, had sex before the age of 15 years.<sup>21</sup>

In most low- and middle-income countries, early sexual debut is common—almost 30% of adolescent girls aged 15–19 years in Central African Republic and adolescent boys in Malawi and Lesotho reported having first sexual intercourse before they were 15 years old. Similarly, more than 10% of girls or boys in Madagascar, Cameroon, Uganda, Kenya, Guyana, Sao Tome, Principe, Senegal, Rwanda, Tanzania, and Kiribati had early sexual debut (Fig. 3).

In addition to HIV risk, early sexual activity is associated with early marriage and early childbearing across the world, which curtails education and other opportunities for adolescent girls to reach their full potential. Indeed, in low- and middle-income countries, 90% of births to adolescents are within marriage. Almost all adolescent births occur within marriage in Asian and North African countries, as do around 70%–80% in sub-Saharan African and Latin American countries and the Caribbean.<sup>22</sup>

The World Health Organization (WHO) reports an estimated 16 million births in girls aged 15–19 years and 2 million births in girls younger than 15 years each year. Worldwide, 20% of adolescent girls have given birth and entered into parenting by the age of 18 years, whereas in the least



Source: United Nations Children's Fund global databases, 2013, based on Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and other national surveys, 2008–2012.

**FIGURE 3.** Percentage of adolescents aged 15–19 years and young women and men aged 20–24 years who had sex before 15 years of age, by country, sex, and age in selected countries, 2008–2012.

developed countries, as many as 1 in every 3 adolescent girls is a mother by the age of 18 years. More than 1 in 4 women aged 20–24 years in sub-Saharan Africa has given birth before 18 years of age. And in 3 countries with the highest prevalence of early childbearing—Guinea, Mali, and Niger—around 10% of women gave birth before 15 years of age.<sup>22</sup>

### Condom Use and Multiple Sexual Partners

Condoms are one of the most efficient means available to reduce sexual transmission of HIV; yet, their use remains abysmally low in several countries with high HIV prevalence. Survey data from 2006 to 2012 show that condom use among adolescents aged 15–19 years who reported multiple sexual partners in the last 12 months before the survey was at least 60% or more in only 2 countries among adolescent girls and in 20 countries among adolescent boys.

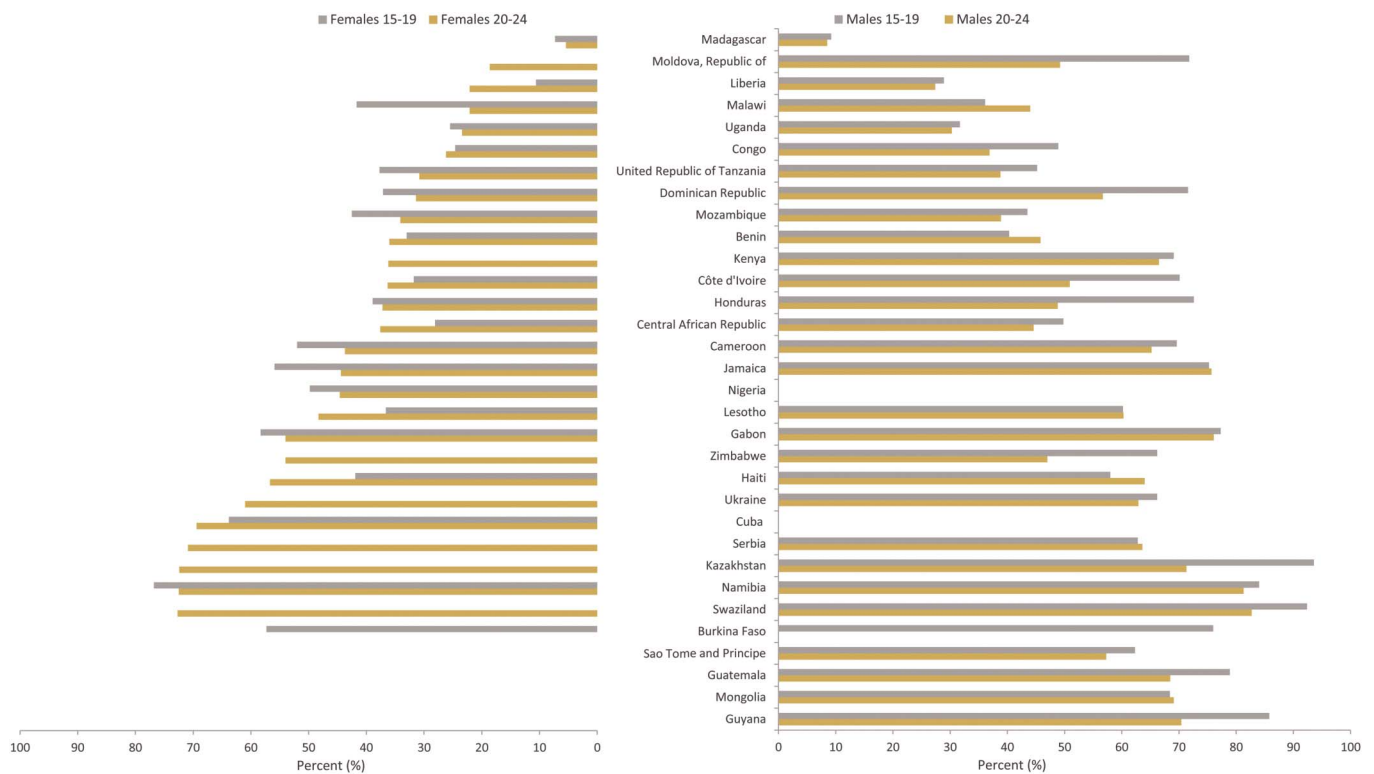
Recent survey data show that having multiple sexual partnerships among adolescent boys, 15–19 years, is common in both low and high HIV prevalence countries, up to 39% in Jamaica and 18% in Mozambique (Fig. 4). However, a lower proportion of adolescent girls than boys reported having had multiple sexual partners across nearly all countries, which ranged from 9% in Congo and Gabon to 16% in Jamaica (Fig. 4). In interpreting these data, consideration should be given to the possibility of individual response bias to sensitive and personal questions.

Even though most countries are still falling short of the 2001 UNGASS target of 95% condom use among those who reported to have had multiple sexual partners, recent survey data in some countries show substantial improvements in this indicator. Between 2000 and 2012, increases of 10 or more percentage points in condom use at last sexual activity among adolescents aged 15–19 years who reported multiple sexual partners occurred in 9 of 22 low- and middle-income countries among adolescent girls and in 10 of 19 countries among adolescent boys.<sup>21</sup>

In most countries, adolescent girls were less likely than boys to use condoms in their most recent sexual experience among those who reported multiple sexual partners. Condom use is also much less common among adolescents in poorer households and in rural areas.<sup>21</sup>

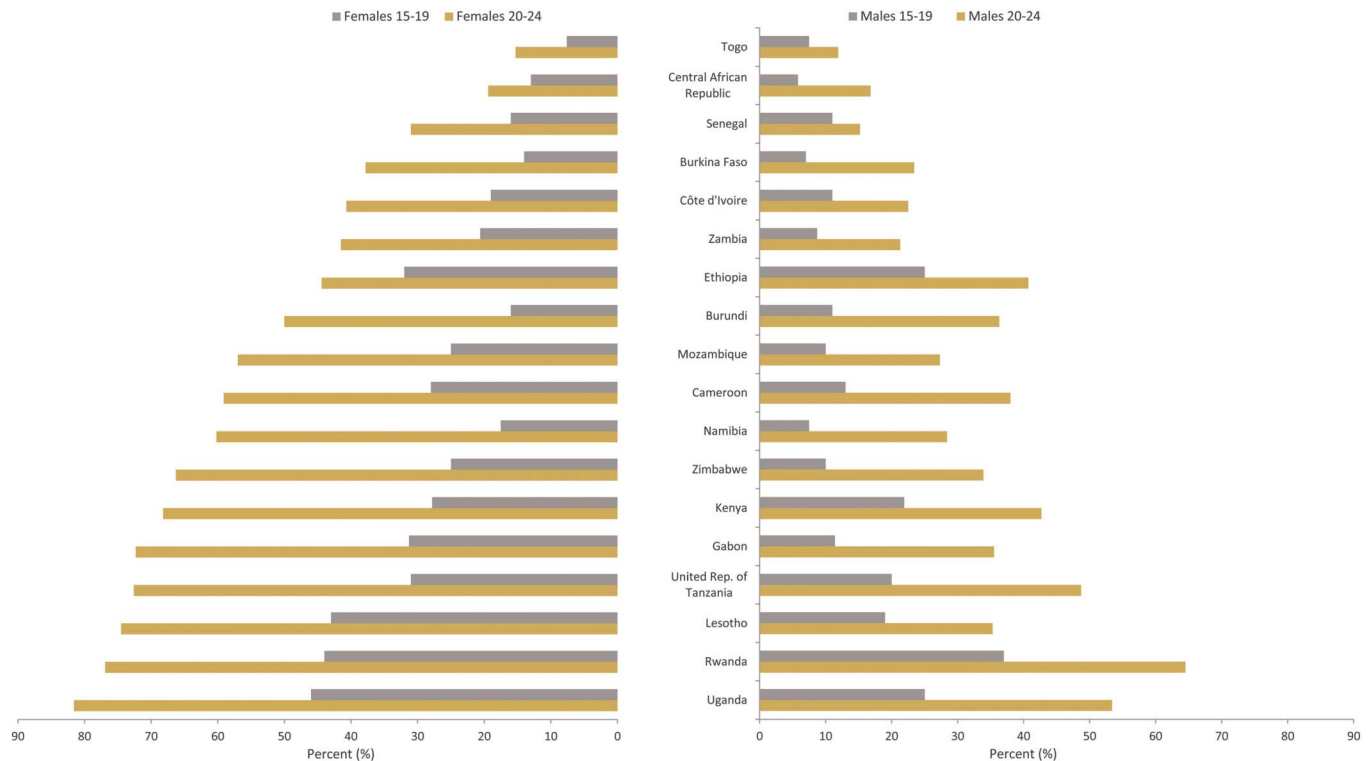
### HIV Testing

Most adolescents do not know their HIV status. Although most adolescents know of a place where they can get tested for HIV, the proportion who reported ever having had an HIV test remains low across most countries; yet, this is a critical step toward access to HIV care and treatment (Fig. 5). Although access and coverage vary greatly by country, survey data from 2008 to 2012 in most sub-Saharan African countries indicate that less than 1 in 3 adolescent girls aged 15–19 years reported having ever been tested for HIV and having received



Source: United Nations Children’s Fund global databases, 2013, based on Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and other national surveys, 2007–2012.

**FIGURE 4.** Percentage of adolescents aged 15–19 and young women and men aged 20–24 reporting multiple partners in the last 12 months who used a condom at last sex, by country, age and sex in selected countries, 2007–2012.



Source: United Nations Children's Fund global databases, 2013, based on Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and other national surveys, 2007–2012.

**FIGURE 5.** Percentage of adolescents aged 15–19 years and young women and men aged 20–24 years who have ever been tested for HIV and received results, by country, sex, and age in selected sub-Saharan African countries, 2007–2012.

the results. Tragically, this is not only a missed opportunity for a well-known entry point to access care and treatment but also a means of preventing HIV infection.<sup>23</sup>

In Eastern and Southern Africa, 29% of adolescent girls aged 15–19 years reported having ever had an HIV test and having received the results, which is higher than adolescent boys (20%),<sup>1</sup> perhaps because of early pregnancies that led them to seek maternal health services and HIV testing linked to antenatal care. In some countries in Asia, the limited data available suggest that over 60% of young key populations initiate sexual activity early in life (by 15–19 years) and yet HIV testing is low.<sup>24</sup>

### HIV Care and Treatment

Age-disaggregated data on coverage of antiretroviral treatment (ART) among adolescents are lacking. Nearly half (1 million) of adolescents living with HIV in low- and middle-income countries were in need of ART at the end of 2012 according to 2010 WHO ART eligibility guidelines.<sup>12</sup> The increased CD4 threshold to 500 for initiation of ART recommended in the 2013 guidelines raises even further the number of adolescents in need of treatment. Given the fact that there continue to be large numbers of perinatally infected children growing into adolescence (long-term survivors), the number of adolescents living with HIV in need of treatment is likely to continue to grow for some time.

Although global data on ART coverage for adolescents are not available, low ART coverage among children aged 0–14 years provides an indication of the inequities in the global response. In 2012, ART coverage among children aged 0–14 years in need of HIV treatment was only 34% compared with 64% of all eligible adults 15 years and older.<sup>5</sup>

Both the increasing AIDS-related deaths among adolescents and the limited studies that exist suggest that adolescents do not have adequate access to ART. Retention and adherence rates also seem to be poor even when enrolled in care and treatment.<sup>25–29</sup> Retaining adolescents in care is particularly challenging. Dealing with the prospect of lifelong treatment is daunting at any time in life, but for adolescents, this comes on top of navigating the usual challenges of their developing maturity—emotionally, psychologically, physically, and sexually.

### Comparing Adolescents and Young People

Across countries in Southern Africa with generalized epidemics, adolescence marks the beginning of an increase in prevalence of HIV, which accelerates through the reproductive years (Fig. 1). Before adolescence, little difference is evident between males and females, whereas females begin to experience much greater levels of HIV than their male counterparts after adolescence. Although the magnitude varies, the trend is the same across countries.

Perhaps most alarming of all, during the period 2005–2012, AIDS-related deaths among adolescents increased by about 50% (from 71,000 in 2005 to 110,000 in 2012), in contrast with a 32% decrease among all other age groups during the same period.

Knowledge about HIV prevention among adolescents and young people is very low, and there is a trend toward adolescent males and females (15–19 years) having less knowledge than young adult males and females (20–24 years) (Fig. 2). Young adult males and females (20–24 years) tend to be more likely than adolescent males and females (15–19 years) to have ever had a test and received their results (Fig. 5).

Adolescent males and females (15–19 years) who had multiple partners in the last 12 months tend to be more likely to report having used a condom than young adult males and females (20–24 years). Although the pattern does not hold for all countries, there is a tendency for young adult females (20–24 years) to be more likely than adolescent females (15–19 years) to have had early sexual debut; but the reverse tends to be true for males (Fig. 3).

## DISCUSSION AND CONCLUSIONS

The remarkable progress made in decreasing new infections from mother-to-child transmission indicates that a concerted global effort, strong political commitment and leadership at the country level, and resource allocation can lead to significant results. The same kind of dedicated attention over time is long overdue for adolescents. The launch of the “global plan toward the elimination of new HIV infections among children by 2015 and keeping their mothers alive”<sup>30</sup> in 2009 has led to rapid reductions in new HIV infections among children in low- and middle-income countries overall and in the 22 priority countries. Globally, 52% fewer children were infected with HIV in 2012 (260,000) than in 2001 (550,000), with an accelerated pace of reduction between 2009 and 2012 compared to the preceding decade.<sup>1</sup> Although declines in new infections have been marked among young children largely because of progress in preventing mother-to-child HIV transmission, the 36% decline in adolescent new infections has been much more modest.<sup>12</sup>

The increase in HIV prevalence during the transition from childhood to adolescence provides clear evidence of the increasing HIV vulnerability in the second decade of life. The package of high-impact interventions that reduce HIV infections, morbidity, and mortality has been clearly laid out in the UNAIDS investment approach.<sup>31</sup> However, without improved data gathering, analysis, and reporting systems specific to adolescents, the international community currently can neither measure the progress in a standardized way nor use the knowledge that comes from such systems to implement the most efficacious programs that can improve health outcomes for adolescents.

### Importance of Prevention

HIV prevention among adolescents is particularly important given their evolving needs—socially, physiologically, and psychologically—as they transition from childhood through adolescence to adulthood. Lack of attention to their

reproductive and sexual health rights and related services at this age can have irreparable consequences in the trajectory of the HIV and AIDS epidemic globally.

Epidemiological, knowledge, and behavioral data from UNAIDS and surveys show modest progress in global prevention efforts and confirm that we are still far from ensuring universal access to critical prevention services and support for adolescents, including provision of age-appropriate information, access to condoms, HIV testing and counseling, and essential sexual and reproductive health and treatment services.

The comparison of adolescents (15–19 years) with young people (20–24 years) on HIV indicators where data are available suggests an important window of opportunity for intervening to reduce HIV risk and vulnerability and reverse the pattern of increasing HIV infection as children mature into adolescence and young adulthood. Before adolescence, little difference is evident between males and females, whereas females begin to experience much greater levels of HIV than their male counterparts after adolescence and throughout the early reproductive years in generalized epidemics. Knowledge of HIV is very low across the board but again tends to be even lower among females. Although the magnitude varies, the trend is the same across countries.

The good news is that positive behavior change among adolescents around some of the key risk indicators is moving in the right direction, eg, regarding age at sexual debut, multiple sexual partners, and condom use. However, the bad news is that it has not been enough. The reduction in risky behaviors has been too slow and has not been sufficient to result in substantial declines in new HIV infections among adolescents, especially girls. This reiterates the need to sustain messaging over time and with successive generations of adolescents.

### More to Learn About Why AIDS-Related Deaths Are Increasing

Estimates of adolescent HIV prevalence include both those who acquired HIV through mother-to-child transmission (perinatal and postnatal transmission through breastfeeding), also known as “vertical” transmission, and those who acquired HIV behaviorally through unprotected sex or sharing of nonsterile injecting equipment. It is not clear what proportion of adolescents living with HIV were infected vertically compared with behavioral transmission. Empirical data are needed to better understand the main modes of HIV transmission among adolescents. Also, globally, there is very limited understanding of the disease progression of children who acquired HIV vertically.

The reported increase in adolescent deaths is based on UNAIDS estimates. There is very little empirical evidence on this phenomenon. The models reflect the increase in the number of women living with HIV giving birth during the late 1990s and early 2000s. The children of those women are recently entering into adolescence. The models assume that untreated children infected from their mothers during pregnancy or delivery average 1 year of survival, whereas children infected during breast-feeding and who receive no ART live for an average of 14 years.<sup>32</sup> Thus, the models estimate that



many children infected during breast-feeding (about half of all vertical transmissions) will die during their adolescence.

Generally, the low level of testing among adolescents could partly be the reason for increased AIDS-related mortality among them. Adolescents who do not know that they are infected with HIV are unlikely to seek ART, and their diagnosis may be substantially delayed until they experience symptoms of advanced HIV disease, in many cases it will be too late for treatment. The very low coverage of pediatric ART in these settings exacerbates this effect. Limited studies indicate that adolescents have poor retention and adherence outcomes even when enrolled in HIV care and treatment. Better data on the survival time of HIV-infected adolescents and uptake of ART and other services are needed to enhance understanding of AIDS-related deaths and other health outcomes among adolescents.<sup>30</sup>

### Data Gaps and Disaggregation

Even where data exist, disaggregation, sample size, and interpretation of those data are often inadequate. For example, basic disaggregation by sex can help to understand factors such as social and economic inequalities and age-disparate sex, which are key factors in the epidemic affecting young women and girls. Disaggregation of HIV care and treatment data for adolescents is not currently possible because of the way they are collected. The disaggregation levels for ART coverage of groups younger than 15 years and 15 years and older do not provide enough information about the developmentally distinct and important subgroups that are hidden in these large age brackets.

In the case of key populations—MSM, sex workers, and PWID—most behavioral surveillance surveys are not nationally representative as they are collected from capital cities or only a few geographic locations. In addition, the indicators, data collection methodologies, and age disaggregation levels are not standardized across countries, making comparative analysis within and between countries even more difficult. There is a need for age-disaggregated data to monitor results with a focus on assessing and responding to disparities in access, coverage, and quality of high-impact HIV interventions and to track progress on implementation of important guidelines, such as the 2013 WHO HIV treatment guidelines<sup>33</sup> and the adolescent HIV testing and counseling and treatment guidelines.<sup>34</sup>

In addition to the factors that increase vulnerability for all adolescents, the vulnerability of adolescents from key populations is profoundly compounded by severe social stigma and harsh, poorly informed, legal, and policy regulations and law enforcement practices that criminalize their behaviors and foster discrimination and violence. These factors hinder access to critically needed health services and other HIV prevention, treatment, protection, care, and support interventions. Age of consent policies and laws are intended to protect youth minors but often have the unintended effect of limiting not only access to services but also the collection of data related to adolescents.

Data are not generally available for younger adolescents aged 10–14 years, even though many engage in sex or other higher risk behaviors much earlier. Current surveys are not designed to collect data on adolescents aged 10–14 years because of the challenges in getting parental approval for their

involvement in surveys and a lack of age-appropriate questions for them. There is a need to develop age-appropriate questions during surveys, which ensure reliability of responses, are acceptable to parents, and conform to sound ethical foundations related to research on minors. Special consideration needs to be given to key populations and other situations where illegal behavior may be involved and where the value of understanding the context needs to be balanced against legal and ethical considerations and foremost ensuring their safety.

### Taking Action

Despite the need for better data related to adolescents, important implications can be drawn from the emerging global, regional, and national data sets. Adolescents constitute about 1.2 billion of the world's population. These adolescents are becoming sexually active and need to understand the risks of HIV and other sexually transmitted infections, especially adolescents living in high HIV burden countries. Demographic projections suggest that the absolute number of adolescents is expected to increase slightly through 2050, leading to a “youth bulge” in developing countries. The adolescent population in sub-Saharan Africa is expected to double in 2050, a region where HIV infections are also highest, and adolescents already account for 23% of the current population. Although data improvements are needed, the current evidence makes clear that adolescents are more vulnerable to HIV than persons in older age groups and that effective interventions are known, invoking an obligation to take action. Given these demographic shifts, it is vital that the post-2015 agenda takes into account age-appropriate HIV-related interventions aimed at reducing risk, vulnerability, morbidity, and mortality among them.

### Limitations

This article provides a snapshot of the HIV epidemic among adolescents and progress made toward addressing the prevention, care, and treatment needs to mitigate risk, infection, and mortality among them. It does neither assess the programmatic effectiveness and scientific evidence of different high-impact interventions nor deal with interventions designed to mitigate the impact of HIV, eg, interventions with orphans and other children infected or affected by HIV and AIDS, that are beyond the scope of this article.

Various development sectors and their program interventions, beyond those that are HIV specific, play a critical role in reducing vulnerability to HIV infection among adolescents. Just as critical are the political commitments and policy and legal environments that address the issues of poverty, low levels of education, marginalization of particular population groups, stigma, and discrimination attached to particular groups or behaviors, among others. Policy and program efforts across the development sectors along with the enabling environment are factors that have significant influence on the effectiveness and success of HIV-specific interventions that enhance HIV knowledge and improve access to testing, care, and treatment services. However, analysis of these factors is beyond the scope of this article.

The data presented in this article show simple aggregate or percent differences in selected outcomes by age and sex and do not control for the interactive effects of various variables, such as education level of respondent, household wealth, rural or urban residence, ethnicity, and other factors. A multivariate (regression) analysis would be more useful in determining the factors most associated with desired outcomes across adolescent subgroups. The findings, however, suggest areas for further research and analysis.

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