

HIV Prevalence Trends and Disparities by Gender and Urban-rural Residence Among Adolescents in Sub-saharan Africa

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Research

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HIV prevalence trends and disparities by gender and urban-rural residence among adolescents in sub-Saharan Africa

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ABSTRACT

Background

In sub-Saharan Africa HIV transmission is a major challenge in adolescents, especially among girls and those living in urban settings. Major international efforts have aimed at reducing sexual transmission. This analysis aims to assess the trends in HIV prevalence by gender in adolescents, as well as urban-rural disparities.

Methods

HIV prevalence data were obtained for 30 countries with a national survey since 2010 and for 23 countries with one survey circa 2005 and a recent survey circa 2015. Countries were grouped into 2% or higher and lower than 2% HIV prevalence among girls 15-19 years in the first survey. Country medians and average annual rates of changes were used to summarize the trends. Data on HIV incidence at ages 15-24 and prevalence at 5-9 and 10-14 years were reviewed from 11 recent national surveys. Trends in urban-rural disparities in HIV prevalence and selected indicators of sexual and HIV testing behaviours were assessed for females and males 15-24 years, using the same surveys.

Results

HIV prevalence among girls 15-19 years declined in the higher HIV prevalence group from 5.7% to 2.6% during 2005-2015, corresponding with an average annual rate of reduction of 6.5% per year. Among boys, the median HIV prevalence declined from 2.1% to 1.2% in the higher prevalence group. Smaller changes were observed in the lower prevalence country group where median HIV prevalence among girls decreased from 0.7% to 0.4% (average annual rate of reduction 5.9%). Girl – boy differences at 10-14 years were small with a country median HIV of 1.0% and 1.3%, respectively. Urban females and males 15-24 had at least 1.5 times higher HIV prevalence than their rural counterparts, and all experienced

similar declines during 2005-2015. Condom use and HIV testing increased among adolescents in both higher and lower prevalence countries, but indicators of sexual activity showed little change over time.

Conclusions

HIV prevalence declined in almost all countries during the last decade, in both urban and rural settings, for both sexes. The urban-rural gap persisted and HIV transmission to girls, but not boys, is still a major challenge in eastern and southern African countries.

Keywords: HIV prevalence, trends, disparities, gender, urban-rural, adolescents, sub-Saharan Africa.

PLAIN ENGLISH SUMMARY

High levels of HIV infection in adolescents have been a major concern in sub-Saharan Africa. In this study we assessed the trends in HIV prevalence by gender in adolescents, as well as urban-rural disparities.

HIV prevalence data were obtained for 30 countries with a national survey since 2010 and for 23 countries with one survey circa 2005 and a recent survey circa 2015. Countries were grouped into higher and lower HIV prevalence among girls 15-19 years in the first survey. Data on HIV incidence at ages 15-24 and prevalence at 5-9 and 10-14 years were reviewed from 11 recent national surveys. Trends in urban-rural disparities in HIV prevalence and selected indicators of sexual and HIV testing behaviours were assessed for females and males 15-24 years.

HIV prevalence among girls 15-19 years declined in the higher HIV prevalence group from 5.7% to 2.6% during 2005-2015. Among boys, the median HIV prevalence declined from 2.1% to 1.2% in the higher prevalence group. Girl – boy differences at 10-14 years were small with a country median HIV of 1.0% and 1.3%, respectively. Urban females and males 15-24 had higher HIV prevalence than their rural counterparts, and all experienced similar declines during 2005-2015. Condom use and HIV testing increased among adolescents in both higher and lower prevalence countries, but indicators of sexual activity showed little change over time.

In conclusion HIV prevalence declined in almost all countries during the last decade, in both urban and rural settings, for both sexes.

Background

High levels of HIV infection among adolescents, especially girls, have been a major concern in sub-Saharan Africa, where about 80% of the world's HIV-infected adolescents live [1,2]. Adolescent girls and young women aged 15–24 years accounted for one in five new HIV infections, despite being just 10% of the population of sub-Saharan Africa [3]. UNAIDS estimated that, between 2010 and 2017, there was a 25% decline in new HIV infections among girls aged 10–19 years in Eastern and Southern Africa, but no decline in West and Central Africa. A recent analysis of pooled data from longitudinal community studies in Southern and Eastern Africa showed that adolescent girls had 5.9 and 3.2 times higher HIV incidence than adolescent boys, respectively, with only limited evidence of a decline over time [4].

Several global and national initiatives have called for greater attention to adolescent girls and HIV, often with ambitious targets. The 'All In to End Adolescent AIDS' initiative, led by UNICEF and other global agencies, aims to reduce HIV infections among adolescents 10-19 years by 75% by 2020 and end the AIDS epidemic among adolescents by 2030 [5]. The DREAMS partnership launched in 2014 in 10 countries in sub-Saharan Africa aims to bring down adolescent and young women new infections by 40% within 2 years [6].

The HIV epidemic in sub-Saharan Africa is characterized by large differences between countries and subregions, and adolescents are no exception [7]. Understanding local epidemiology within each country is essential to effectively target HIV prevention efforts [8]. This includes consideration of distal socioeconomic and residential characteristics as well as biological and behavioural factors that affect HIV transmission [9,10].

Within countries, there are often major differences in HIV prevalence by socioeconomic and geographic characteristics [11]. National surveys often show higher HIV prevalence among adolescents and adults with more education, living in wealthier households or in urban areas compared to less educated,

poorer and rural residents [12-13]. These inequality patterns differ from those observed for many other infectious diseases and for reproductive, maternal and child health but may change if urban, wealthier and more educated populations are quicker to adopt interventions or behavioural changes. An analysis of seven countries in sub-Saharan Africa found limited evidence such changes among educated adolescents prior to 2013 [14].

Data on levels, trends and inequalities in HIV among adolescents are critical to inform the response in countries. The increasing number of national surveys with HIV testing makes it possible to investigate HIV in adolescents in more countries and obtain a (sub)regional picture. In this paper, we examined HIV trends among adolescent girls and boys in sub-Saharan Africa, using national population-based surveys conducted during the last two decades. We assessed urban – rural differences in HIV prevalence and selected indicators related to sexual behaviour and HIV testing.

Methods

The data were derived from national household surveys with HIV testing. We identified 77 surveys with HIV testing conducted in sub-Saharan Africa since 2003, including Demographic and Health Surveys (DHS), AIDS indicator Surveys (AIS) [15], Population HIV Indicator Assessment (PHIA) surveys [16] and specific national surveys (see Additional file 1). For the DHS and AIS surveys, conducted between 2003 and 2018, data sets are in the public domain and standardized indicators are available [17]. All 11 PHIA surveys were conducted from 2015 but only four surveys data sets were available in the public domain at the time of our analyses (Eswatini, Malawi, Tanzania, and Zambia). We extracted information from the PHIA national reports for selected indicators where possible. Kenya, Nigeria, South Africa and Eswatini conducted other types of national HIV surveys for which only national reports were available, which were only included if adolescent HIV prevalence estimates were available.

We focused on the assessment of trends in countries with a survey before and after 2010 (the most recent survey). We included Burkina Faso with the last survey in 2010 and Burundi with the last survey in 2010. We classified the countries according to HIV prevalence among girls 15-19 years in the survey prior to 2010 into a higher HIV prevalence (2.0% or higher) and lower HIV prevalence group (lower than 2.0%). This resulted in 21 countries in the higher prevalence group and 12 in the lower prevalence group (see Additional file 1).

Subregional levels and trends were summarized with country medians and the annual average rate of change in HIV prevalence between the first (p_1 , referring to HIV prevalence at time t_1) and last survey (p_2 , HIV prevalence at time t_2), defined as the average relative percent decrease per year in HIV prevalence, for girls in the higher prevalence group of countries ($\ln(p_2/p_1)/(t_2-t_1)$). No such computations were done for the lower prevalence group as large sampling errors tended to yield

unstable results. All analyses were conducted in Stata version 15 (StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC) and MS Excel.

For all indicators, we computed 95% confidence intervals if the data were available. For several surveys we extracted the most recent data with 95% confidence intervals from the reports. We tested for statistical significance of indicator trends over time by estimating the level of significance in the proportions' differences using a formula developed by Altman and Bland [18].

Recent advances have made it possible to directly estimate incidence in cross-sectional surveys, using an algorithm based on limited antigen (Lag) avidity assay, viral load, and ARV use [19].. We compiled HIV incidence data at ages 15-24 years from eight PHIA surveys that reported with age-disaggregated data and one national survey in South Africa. The numbers were too small for disaggregation by urban-rural residence and no trend assessment could be done.

HIV prevalence among adolescents has been used as a proxy measure for incidence as the majority of infections represent recent sexually acquired infections and direct measurement of incidence was limited [20]. Even with HIV incidence measurement available, data are needed to assess the distribution of prevalent infection in subpopulations. Because of the scale-up for antiretroviral therapy (ART) for children [21], prevalent adolescent HIV infection may include a rising number of non-sexually acquired infections who survive into adolescence, which affects the interpretation of adolescent prevalence statistics [22]. To obtain an idea of the size of this effect, we also examined HIV prevalence rates at ages 5-9 and 10-14 years from recent PHIA surveys when sexual transmission is likely to be low. Data were available from 11 of the 12 countries in the higher prevalence group. For South Africa, no five-year age group data were available to us.

For disaggregation by urban-rural residence, we used data for the age group 15-24 years, to reduce sampling error. The correlation between HIV prevalence at ages 15-19 and 15-24 years was high for both females and males (Pearson's correlation coefficient $r > 0.90$) (see Additional file 2).

Urban – rural residence may affect HIV transmission through a set of proximate determinants which are behavioural in nature with a proven effect on the biological components of transmission such as risk of exposure and transmission efficiency [23,18]. We examined trends in selected Indicators of the proximate determinants, based on the availability of comparable time trend data from DHS, in urban-rural populations, disaggregated by gender:

- sexual initiation: percentage of women/men 18-24 years who initiated sex before age 18.
- premarital sexual activity: percentage of young never married women/men age 15-24 who had sex in the last 12 months of all young single women/men surveyed among respondents 15-24 years;
- multiple partnerships: percentage of young women/men age 15-24 who had sex with more than one partner in the 12 months preceding the survey among women/men who had sexual intercourse in the 12 months preceding the survey;
- condom use: percentage of young never married women/men age 15-24 who used a condom at last sex, of all young sexually active women/men surveyed.
- HIV testing: percent who received an HIV test in the last 12 months among sexually active respondents 15-24 years.

Trend data were available for 10 countries in the higher prevalence group and 13 countries in the lower prevalence group.

Results

HIV prevalence at 15-19 years

The median adolescent HIV prevalence in 31 countries with a national survey conducted since 2010, was 3.3% for girls and 1.4% for boys 15-19 years, in the higher prevalence country group, and 0.6% for girls and 0.3%, respectively, in the lower prevalence group (Table 1).

Among the 11 higher prevalence countries with two data points, all located in eastern and southern Africa except Cameroon, the median HIV prevalence among girls decreased from 5.7% to 2.6% during 2005-2017, corresponding with an average annual rate of reduction of 6.5% per year, with reductions in all countries (Figure 1). The average annual rate of reduction was 4% or higher in six countries. The difference between the two surveys was statistically significant at the 5% level in Eswatini, Malawi, Tanzania, Zambia and Zimbabwe.

In the 13 lower HIV prevalence countries with two data points, all located in West and Central Africa except Ethiopia, median HIV prevalence among girls decreased from 0.7% to 0.4% (average annual rate of reduction 5.9%), with Liberia and Burkina Faso having the largest declines ($p<.05$).

Among boys, the median HIV prevalence declined from 2.1% to 1.2% in the higher prevalence group of 11 countries. The average annual rate of reduction exceeded 10% in Kenya, Tanzania and Zambia, but in five countries no declines were observed. In the lower prevalence group, HIV prevalence remained low (country median of 0.3% in first and last survey). The difference between the two surveys was statistically significant at the 5% level in Tanzania and Zambia.

Early adolescence

Median HIV prevalence at 10-14 years was 1.0% for girls and 1.3% for boys among 11 countries with recent surveys, all in the higher prevalence group (Figure 2 and Additional file 3). The girl-boy differences were small (less than 1%) as expected in the case of predominance of vertical transmission of HIV, with the exception of Eswatini where boys (5.7%; 95% CI 2.8-6.5%) had considerably higher prevalence than girls (3.4%; 95% CI 1.8-5.1%). This difference, however, was not statistically significant. HIV prevalence at 5-9 years was similar to that at age 10-14 years in all countries, with a country median of 1.3% for girls and 0.9% for boys.

At ages 15-19 years, HIV prevalence was higher than at 10-14 years in nine of the 11 countries for girls (median 1.1% higher). The difference was statistically significant at the 5% level in six of the eight countries with sufficient data: Eswatini, Lesotho, Namibia, Tanzania, Uganda and Zambia for boys, the differences between 15-19 and 10-14 years were small and non-significant in all countries.

HIV incidence

In all nine surveys with data, female HIV incidence at 15-24 years was considerably higher than for males. Among females, eight of nine countries had annual HIV incidence of 0.5% or higher (see Additional file 4). Among males 15-24 years, only Eswatini and South Africa had incidence of 0.5% while all other surveys registered HIV incidence of 0.2% or lower, indicating generally low HIV transmission. Sampling errors for incidence data are large and no attempt was made to disaggregate by urban – rural residence or obtain estimates for adolescents 15-19 years.

Urban – rural disparities: HIV prevalence

Urban-rural data were not available for Eswatini, Kenya and South Africa. Among remaining eight higher prevalence countries with two surveys, the country median HIV prevalence at 15-24 years declined from 11.2% to 7.1% for urban females, at an annual rate of reduction of 4.6% (Figure 3). Rural female HIV prevalence also declined from 7.2% to 4.3%, at a similar annual rate of reduction (5.2%). All countries had urban and rural declines in HIV prevalence which only in Zimbabwe (both urban and rural), Malawi and Cameroon (rural only), and Zambia (urban only) reached statistically significance at the 5% level (Additional files 5 and 7).

For males 15-24 years in the higher prevalence group of countries, urban and rural HIV prevalence declined from 4.5% to 2.6% and from 2.5% to 1.7% respectively. This corresponds with a similar rate of average annual rate of reduction as for females, at 5.7% and 4.2% for urban and rural, respectively. Among 11 countries with lower HIV prevalence, there were no major changes over time for urban and rural females and for rural males. The only reduction was for urban males (from 0.9% to 0.4%), driven by a decline in 6 of the 11 countries.

Urban – rural disparities: behaviours

Table 2 (and Additional file 6) summarize the urban – rural trends in adolescent and young adult sexual behaviour and HIV testing. The three indicators of sexual activity (age at first sex, multiple partnerships and premarital sex) did not change much between the first and last surveys. Urban – rural differences and differences between the higher and lower HIV prevalence groups of countries remained of the same order of magnitude among both sexes.

Condom use at premarital sex among females and males was higher in urban than rural areas, and higher in countries more affected by HIV than in the lower prevalence group. There was an increase

among urban and rural females and males in the period between the two surveys, which was greater in rural populations, reducing the urban-rural gap. Urban condom use remained considerably higher than rural use, especially in the lower prevalence countries.

HIV testing in the last 12 months among sexually active female and male respondents 15-24 years increased dramatically in both urban and rural settings in the high prevalence countries, reaching a median of about 56% and 39% for females and males, respectively. In the low prevalence countries, HIV testing also increased among all groups, but was much lower (17% and 6% for females and males respectively), and only slightly higher in urban than rural settings.

Discussion

HIV prevalence among adolescent girls 15-19 years decreased in all 11 higher prevalence countries in sub-Saharan Africa between 2005 and 2015, resulting in a decline of the country median 5.7% to 2.7%. Also, among boys 15-19 years the median prevalence declined in the same countries from 2.1% to 1.2%. Changes were more modest in the lower HIV prevalence group where prevalence is below 1% in girls and boys in most countries.

These prevalence trends among girls 15-19 years are likely to present an underestimate of the reductions in HIV transmission due to sexual behaviour. Prior to the introduction of antiretroviral therapy in children, only a small proportion of adolescents would have acquired HIV from their mothers, as most would have died before reaching age 15. Most infections would be sexually transmitted, almost exclusively to girls due to partnerships with older men, as their male peers have HIV prevalence close to zero in many countries. The reduced prevalence for children 5-9 and 10-14 years, about 1% in the higher prevalence countries, gives an indication of the size of the effects of increasing coverage with ART in

children with vertically transmitted HIV, as boy-girl differences were negligible. In another study, maternal transmission was also considered a likely explanation for the higher prevalence among adolescent orphans 15-17 years old compared to non-orphaned peers [19].

The differences between adolescent girls and boys remain striking. Female incidence at 15-24 years is at least 0.5 per 100 per year in most countries with higher prevalence, while male levels are close to zero. Unfortunately, incidence measurement in surveys is still affected by sample size limitations for this relatively rare event, and no estimates are available for 15-19 years. The prevalence data however confirm the importance of sexual transmission among girls and not among boys, based on the lack of difference between 10-14 years and 15-19 years prevalence among boys and large sex difference in HIV prevalence at 15-19 years which is not expected as a result of vertical transmission.

In virtually all countries, urban and rural HIV prevalence among adolescents and young people 15-24 years declined at a similar pace, leaving the gap unchanged. Urban adolescents are still disadvantaged with higher HIV risks. Self-reported behavioural indicators did not help explain this disadvantage.

Sexual risk behaviours as measured by sexual initiation before age 18, premarital sexual activity and multiple partnership among sexually active adolescents and young people, were remarkably similar in surveys before 2010 and from 2010 in most countries. There was however an increase in reported condom use at premarital sex in both higher and lower prevalence countries, and a major increase in HIV testing rates among adolescents and young adults of both sexes in higher prevalence countries, irrespective of place of residence. The increase in condom use in both urban and rural adolescents is encouraging, even though there are concerns about the shift in emphasis on long term methods in family planning programs leading to less emphasis on condoms which is the only method that protects against pregnancies and sexually transmitted infections [20].

Even though there were improvements in preventive interventions, notably condom use, HIV testing and male circumcision, there is much room for further increases in safe sexual practices among adolescents. To reduce HIV transmission in adolescent girls these improvements are needed in both urban and rural settings.

We considered only macro trends for a limited number of indicators with comparable data. Other indicators, such as age mixing (younger girls having sex with older men), concurrent partnerships and sexual networks, other sexually transmitted infections, and male circumcision have been shown to be major factors in the epidemic[21-22]. There is evidence from surveys of increases in male circumcision rates in multiple countries, and more so in urban areas [23,24].

Our study has several limitations. The urban-rural analyses were based on the age group 15-24 years for disparity analysis to reduce sampling errors. We however showed that HIV prevalence at 15-24 years was highly correlated with 15-19 years and is likely to be indicative of urban-rural differences at ages 15-19 years.

Non-response rates in the surveys are not likely to be a major issue, as the median HIV testing and interview response rates for girls and boys 15-19 years in DHS and AIS surveys was about 90%, with only one survey with response rates below 70% (South Africa 2016). Sexual behaviour reporting is subject to multiple biases, of which underreporting related to stigma or desirability bias is the most problematic, especially by girls and young women [25,26]. The consistency of the results between consecutive surveys in the same country was however remarkable, suggesting no major change in bias over time.

The ability to explain the urban rural differences through behavioural indicators was limited. In fact, the behavioural indicators in this study would suggest higher HIV risks for rural than urban adolescents. This however is not the case, indicating that other factors underpin urban rural differences in HIV

transmission are likely to play a role but are difficult to measure at a comparative level In-depth country studies may be more illuminating. In addition, our analysis did not consider within urban inequalities, especially the HIV risk among the urban poor [27]. This needs more attention in future research.

Conclusions

HIV transmission among adolescents 15-19 years has reduced considerably in the past decade but sexual transmission is still a major issue for adolescent girls. Increased condom use and HIV testing may have contributed to the decline which was similar in urban and rural settings. Urban adolescent girls remain at greater risk of HIV especially in higher prevalence countries and need to be targeted in prevention programs.

Supplementary information

Additional files

Additional file 1. National surveys with HIV testing with year of completion, xls, 33-countries table checklist.

Additional file 2. Correlation between HIV prevalence at ages 15-19 and 15-24 by gender, xls, 02 figures for females (A) and males (B).

Additional file 3. HIV prevalence at ages 15-24 by gender and residence area, xls. 01 table.

Additional file 4. HIV Incidence at ages 15-24 by gender, xls, 04 tables and 01 figure.

Additional file 5. Urban – rural trends in adolescent and young adult sexual behaviour and HIV testing, xls, 04 tables.

Additional file 6. Behaviours indicators, xls. 03 tables.

Additional file 7. Urban-rural prevalence trends at ages 15-24, xls, 01 table

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

Reasonable requests can be made to access the data analysed in this study from the corresponding author.

Competing interests

We have read and understood BMJ policy on declaration of interests and have no interests to declare.

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Authors' contributions

All authors have read and approved the final manuscript.

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Table 1 HIV prevalence among girls and boys 15-18 years, by higher and lower prevalence country group

Country	Year			Girls, 15-19			Boys, 15-19			
	First	Last	First	95% CI	Last	95% CI	First	95% CI	Last	95% CI
Higher prevalence										
Cameroon	2004	2018	2.1	1.3; 3.0	1.2	na	0.6	0.2; 1.1	0.2	na
Eswatini	2007	2017	10.1	8.1;12.1	7.2	5.4; 9.0	1.9	0.9; 2.8	3.9	2.5; 5.4
Kenya	2003	2018	3.0	1.7; 4.3	1.2	na	0.4	0.0; 0.8	0.5	na
Lesotho	2004	2017	7.8	5.6;10.1	5.7	4.1; 7.2	2.3	0.7; 3.9	2.8	1.8; 3.8
Malawi	2004	2016	3.7	1.9; 5.5	2.0	1.2; 2.8	0.4	0.0; 1.0	0.9	0.4; 1.4
Mozambique	2009	2015	7.1	4.7; 9.5	6.5	4.7; 8.4	2.7	1.4; 4.1	1.5	0.5; 2.4
Namibia		2017			4.7	3.5; 5.9			2.7	0.9; 3.1
South Africa	2008	2016	6.7	na	5.9	3.5; 8.4	2.5	na	4.1	0.8; 7.5
Tanzania	2004	2017	2.1	1.2; 3.0	1.0	0.6; 1.5	2.1	1.1; 3.1	0.4	0.0; 0.7
Uganda	2005	2017	2.6	1.8; 3.4	1.8	1.2; 2.4	0.3	0.0; 0.5	0.5	0.2; 0.7
Zambia	2007	2018	5.7	4.3; 7.2	2.6	1.9; 3.2	3.6	2.2; 5.0	1.2	0.7; 1.7
Zimbabwe	2006	2016	6.2	4.7; 7.7	3.9	3.1; 4.7	3.1	2.0; 4.2	3.2	2.3; 4.2
Lower prevalence										
Angola		2016			0.8	0.1; 1.5			0.6	0.0; 1.2
Burkina Faso	2003	2010	0.9	0.2; 1.6	0.1	0.0; 0.4	0.7	0.0; 1.5	0.4	0.0; 0.9
Burundi	2010	2017	0.2	0.0; 0.5	0.1	0.0; 0.2	0.3	0.0; 0.7	0.0	0.0; 0.0
Chad		2015			1.2	0.5; 1.8			0.4	0.0; 0.7
Cote d'Ivoire	2005	2018	0.4	0.0; 0.9	0.6	na	0.2	0.0; 0.6	0.4	na
DR Congo	2007	2014	0.7	0.1; 1.3	0.7	0.0; 1.6	1.7	0.0; 3.4	0.2	0.0; 1.4
Ethiopia	2005	2016	0.7	0.1; 1.3	0.4	0.1; 0.7	0.1	0.0; 0.4	0.0	0.0; 0.0
Gabon		2012			1.5	0.1; 2.9			0.4	0.0; 0.8
Gambia		2013			0.4	0.0; 0.9			0.3	0.0; 0.9
Ghana	2003	2014	0.5	0.1; 1.0	0.3	0.0; 0.7	0.2	0.0; 0.6	0.2	0.0; 0.5
Guinea	2005	2018	0.9	0.1; 1.7	1.2	0.5; 1.8	0.5	0.0; 1.1	0.9	0.1; 1.6
Liberia	2007	2013	1.2	0.5; 2.0	0.2	0.0; 0.6	0.4	0.0; 1.0	1.0	0.0; 2.1
Mali	2006	2013	0.6	0.1; 1.2	0.8	0.1; 1.5	0.7	0.1; 1.3	0.3	0.0; 0.9
Niger	2006	2012	0.0	0.0; 0.0	0.0	0.0; 0.0	0.0	0.0; 0.0	0.0	0.0; 0.0
Nigeria		2018			0.7	na			0.1	na
Rwanda	2005	2015	0.7	0.2; 1.6	0.9	0.4; 1.4	0.3	0.0; 0.6	0.3	0.0; 0.6
Senegal	2005	2017	0.2	0.0; 0.4	0.0	0.0; 0.1	0.0	0.0; 0.0	0.0	0.0; 0.1
Sierra Leone	2008	2013	1.3	0.3; 2.2	1.5	0.8; 2.2	0.0	0.0; 0.0	0.7	0.2; 1.1
Togo		2014			0.4	0.0; 0.8			0.1	0.0; 0.3
Median high HIV										
HIV	2005	2017	5.7		2.6		2.1		1.2	

Median low						
HIV	2005	2015	0.7	0.4	0.3	0.3
Median all						
high		2017		3.3		1.4
Median all						
low		2014		0.6		0.3

na: not available

Table 2 Selected behavioural indicators among women and men 15-24 years, grouped by HIV prevalence, in urban and rural residence, national surveys (median percent, countries).

		All		Urban		Rural	
		2006*	2015*	2006*	2015*	2006*	2015*
Higher HIV prevalence countries (N=10)							
Women	Sex before age 18	58.5	57.7	48.4	46.8	60.9	60.6
	Premarital sex	29.2	36.1	34.5	37.7	27.2	30.7
	Condom use at last premarital sex	43.5	55.2	54.3	64.4	32.8	46.0
	Multiple partners in last year	3.7	4.4	4.9	5.5	3.0	3.3
	HIV tested in last year	22.6	56.2	31.9	61.7	16.6	52.3
Men	Sex before age 18	51.5	52.5	52.1	51.7	54.5	55.4
	Premarital sex	38.5	43.9	42.5	48.7	38.7	44.8
	Condom use at last premarital sex	56.5	72.4	72.3	78.1	45.6	65.7
	Multiple partners in last year	23.5	24.4	25.6	27.3	22.9	22.9
	HIV tested in last year	12.9	39.0	18.6	47.1	11.2	32.8
Lower HIV prevalence countries (N=13)							
Women	Sex before age 18	61.2	59.8	44.7	44.8	66.7	66.8
	Premarital sex	31.0	23.6	33.4	29.4	31.0	21.3
	Condom use at last premarital sex	25.7	27.7	35.8	37.7	16.4	18.5
	Multiple partners in last year	3.6	2.5	4.6	4.2	2.7	3.1
	HIV tested in last year	3.6	17.2	7.8	19.8	1.5	15.2
Men	Sex before age 18	32.4	26.8	36.5	28.1	29.0	24.8
	Premarital sex	29.5	27.5	31.9	35.4	27.2	23.6
	Condom use at last premarital sex	45.1	51.1	57.0	62.2	27.9	43.4
	Multiple partners in last year	22.7	23.7	22.3	25.3	22.5	22.5
	HIV tested in last year	3.2	6.4	4.4	9.3	2.1	5.0

(*) Years of surveys are Circa.

Figures

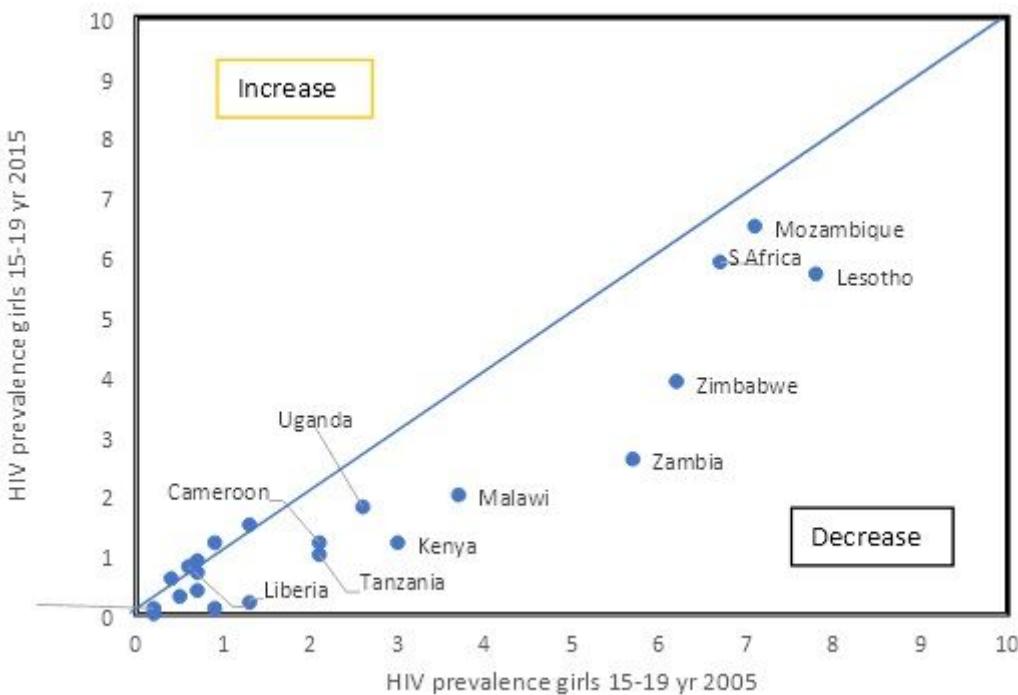


Figure 1

HIV prevalence trend among individual countries, surveys conducted circa 2005 and circa 2016.

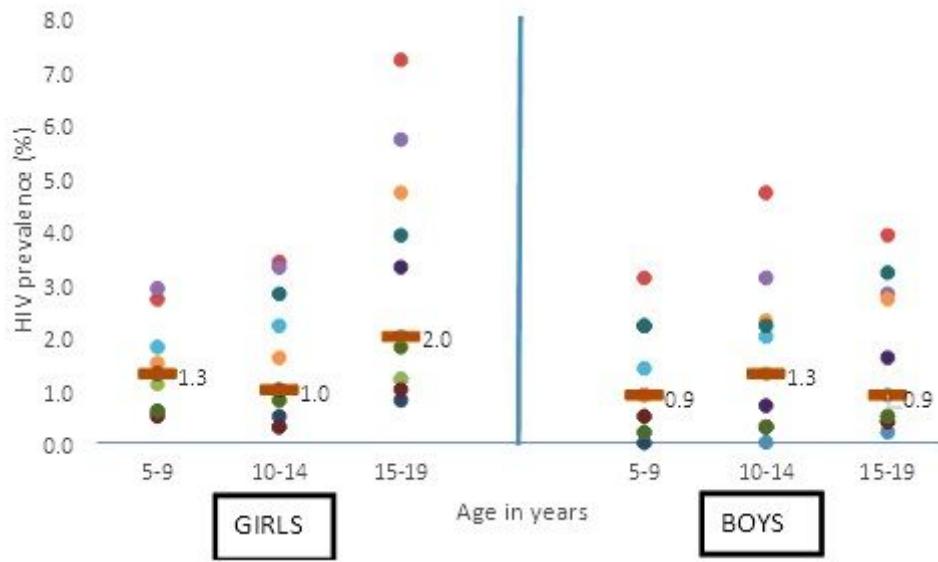


Figure 2

HIV prevalence at ages 5-9, 10-14 and 15-19 years, PHIA surveys and South Africa national survey conducted 2015 or later (dash indicates country median, dots represent country values).

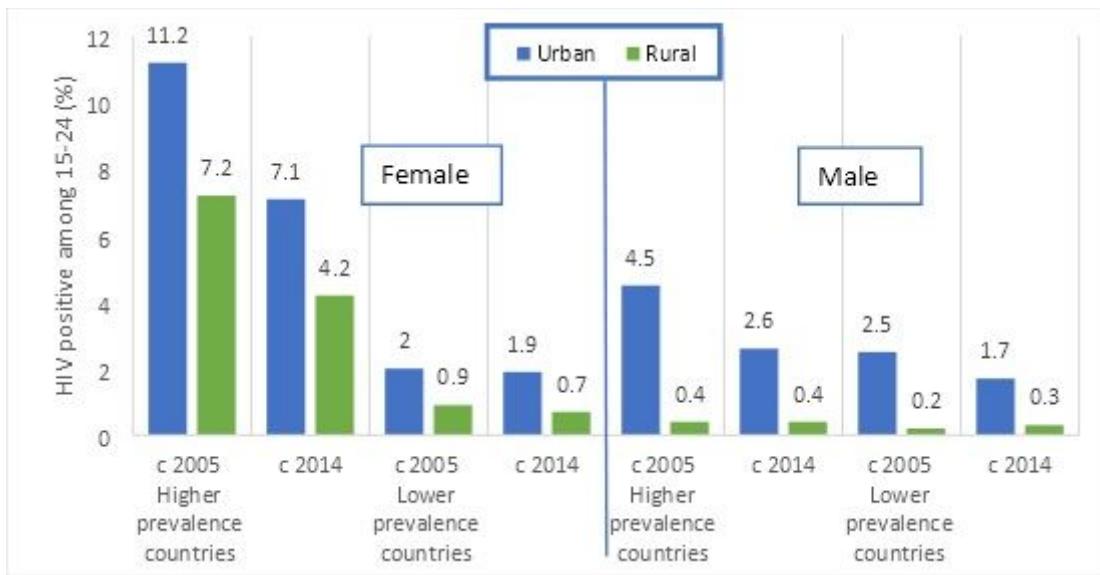


Figure 3

HIV prevalence among females and males 15-24 years, median of higher and lower prevalence country groups, according to surveys circa 2005 and circa 2014.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile6.Behaviourindicators.xlsx
- Additionalfile6.Behaviourindicators.xlsx
- Additionalfile7.Urbanruralprevalencetrends.xlsx
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- Additionalfile5.Urbanruraltrends.xlsx
- Additionalfile5.Urbanruraltrends.xlsx
- Additionalfile4.HIVincidence.xlsx
- Additionalfile4.HIVincidence.xlsx
- Additionalfile3.HIVprevalence.xlsx
- Additionalfile3.HIVprevalence.xlsx
- Additionalfile2.Correlationbetweenhivprevalence.xlsx
- Additionalfile2.Correlationbetweenhivprevalence.xlsx
- Additionalfile1.Nationalsurveyswithhivtesting.xlsx
- Additionalfile1.Nationalsurveyswithhivtesting.xlsx