Profiling HIV prevalence among women in East Africa: Who are most-at-risk?

Abstract

Though its global incidence is declining, HIV/AIDS remains the leading cause of death in women of reproductive age in sub-Sahara Africa. This study aimed to examine the predictors of HIV prevalence among women (15-49) in Eastern Africa; and identify the most-at-risk groups for HIV sero-positivity. Overall, marital status was the best predictor of HIV sero-status. The probability of being HIV-positive is higher among widows and divorced. The effect of age, wealth index and place of residence varies by marital status and country. These findings suggest that unmarried sexually active women provide an important pool of HIV transmitters. Furthermore, the study reveals interaction between demographic and modernity theories. Therefore, to achieve zero new infection one of HIV eradication strategy, interventions should target and prioritize groups according to their prevalence and demographic weight. Majority of HIV programs focus on the sexual workers and pregnant women because they are easily identifiable.

Introduction

Though general HIV prevalence has declined for the past two decades, HIV/AIDS remains the leading cause of death in women of reproductive age in sub-Sahara Africa (SSA). In 2014, 25.8 million people were living with HIV in sub-Saharan Africa, among which more than half were female. East Africa is the second most HIV affected in the world after Southern Africa. According to recent estimates from Demographic and Health Survey (DHS), national HIV prevalence among women of reproductive age is less than two in Eritrea, Ethiopia, Madagascar and Mauritius. The prevalence exceeds 10 in Malawi, Mozambique, Zambia and Zimbabwe.

A number of HIV prevention programs have been implemented in sub-Saharan Africa in order to tackle HIV in the region. Large-scale prevention initiatives to contain and reduce HIV/ AIDS epidemic, include condom distribution, HIV testing and counseling, preventing mother-to-child transmission, reducing injecting drug use and access to antiretroviral treatment. However, despite substantial progress made, the gap between the current state of HIV/AIDS and the UNAIDS goals of three zero (zero new HIV infections, zero discrimination and zero AIDS-related deaths) remains important.

Given the high cost of HIV/AIDS treatment estimated in 2010 to be globally between US$22 and US$24 billion annually and the individual cost of US$4707 over a lifetime to reach global targets, targeted interventions and evidence-based prevention programs have been advocated as a cost-effective strategy to combat HIV/AIDS. Such a strategy optimizes the coverage, reduce the costs and lower the number of new infections. However, despite growing literature in health and social sciences on factors associated with HIV/AIDS during the last three decades, it is still challenging to precisely define the most-at-risk groups for HIV especially in countries with high prevalence. Indeed, whereas in countries with concentrated HIV/AIDS epidemics (Latina America, East Asia, Eastern Europe and Western Africa), the most-at-risk populations including Commercial Sexual Workers (CSWs), long distance truck drivers and men who have sex with men (MSM) account for a large proportion of new infections, in countries with high prevalence, they account only for a smaller share of new infections. Furthermore, the profiles of the most at risk populations might results from interaction between several variables and might differ by country.

Against this backdrop, this study aims to identify the socioeconomic predictors of HIV infections and define the most-a-risk groups among women for better-targeted and cost-effective interventions in seven Eastern African countries, including Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe.

Theoretical considerations

This research relies on three complementary theories: the demographic model, the poverty model and the modernity model.

Demographic/ Sexual behavior model

According to the demographic model, HIV prevalence is higher among women exposed to unprotected and/or concurrent sexual partners women, which vary by age, longer period of pre-marital, greater number of lifetime sexual partners, marital status and number of unions.

Poverty model

This model assumes that poorest people are disproportionately vulnerable to contracting HIV. Poverty creates an environment in which individuals especially women are particularly susceptible and vulnerable to HIV/AIDS. This includes risk of transactional sexual activities among the poorest, individuals with little or no education who tend to have poor access to safe- sex information and are less likely to use condoms

Modernity model:

This model assumes that wealthier rather than poorer individuals, urban rather rural, educated rather than uneducated have higher HIV infection rates.

Data and Methods

The study used data from the DHS conducted in East African countries from 2009 to 2014. We selected all countries of the region with at least five percent of HIV prevalence. In total, the database includes 73,930 women aged 15-49. The distribution of the sample by age shows that more than half (65%) of the population is aged less than 30 years. The average age of the sample is estimated at 29.5 years [Confidence interval (CI): 29.4-29.54]. The proportion of adolescent (15-19) varies from 9% in Kenya and Zimbabwe to more than 22% in Uganda and Zambia. The corresponding proportion is estimated at 12% in Malawi and Tanzania; and 15% in Mozambique. The proportion of women aged 40 and above varies from 15% in Zambia to 22% in Tanzania.

The majority of women (66%) were in union during the survey. The percentage of women who are in union (ie, currently married or living with a man) varies from 59% in Zambia to 77% in Malawi. The proportion of women who have never been in union is estimated at 21%. Malawi (7.5%) and Zimbabwe (9%) have the lowest proportion of women who have never been in union compared to Uganda and Zambia (29%). On average 12% of surveyed women were widows or divorced. This proportion varies from 10% in Tanzania and Uganda to 17% in Zimbabwe. Regarding number of children ever born, the majority of women have at least one child (77%). The proportion of women who have never had a child varies from Malawi (8%) and Zimbabwe (9%) to 29% in Uganda and Zambia (29%). About 70% of participants live in rural areas. This proportion varies from 53% in Mozambique and Zambia to 87% in Malawi. By level of education, 12% of women never attended school, while more than 32% have attended at least secondary school. Proportion of women with secondary education or higher varies from 17% in Malawi and Tanzania to 65% in Zimbabwe.

Variables

The dependent variable for this analysis is HIV status, characterized as a positive or negative blood test. The independent variables include eight main variables grouped into two major types including: demographic and reproductive behavior variables (age, marital status and number of children ever born), and socio-economic and contextual variables (country, region of residence, place of residence, education and household wealth index). The choice of these variables is guided by the literature on factors associated with HIV in sub-Saharan Africa. We assume that the most-at-risk populations refer to a combination of several factors because socioeconomic factors associated with HIV are not mutually exclusive.

Statistical techniques

Statistical analyses relied on Pearson's chi-square and the chi-square Automatic Interaction Detector (CHAID) using SPSS V.21 and the multilevel mixed-effects logistic regression. Pearson's chi-square allows identifying associations between HIV status and selected

demographic and socioeconomic characteristics.

We run Chi-square Automatic Interaction Detector (CHAID) (Kass 1980) to identify predictors of HIV sero-prevalence and describe the profiles of who are living with HIV. For each homogeneous category, the CHAID model provides the following indicators:

1. Node: provides the number and percentage of people belonging to a selected category *j* (demographic weight in the sample);
2. Gain for each terminal node is the number of children who live with HIV in absolute terms. In percentage, gain is calculated as the number of women living with HIV in a selected node divided by the total number of women living with HIV. Part of the population with the observed characteristic (women living with HIV) in a selected category compared to total number of women living with HIV.
3. Response defined as the proportion of women living with HIV among those belonging to each terminal node.
4. Gain index percentage reports how much greater the proportion of a given target category at each node differs from the overall proportion. It is obtained by dividing the proportion of records that present category *j* in each terminal node into the proportion of records presenting category *j* in the total population. Thus, it represents the increased probability of belonging to the selected category *j* that contains the records presenting the characteristics defined for each terminal node.

However, CHAID does not take into account the hierarchical structure of this data. Some women live in the same region.

3. Results

HIV prevalence by selected background characteristics

On average, 10.7% of women in the seven countries are HIV-positive. The HIV prevalence varies from 5.5% in Tanzania to 18% in Zimbabwe. Overall, all independent variables are statistically associated with HIV infection status except in Zimbabwe. The HIV prevalence is low (4.1%) among adolescents (15-19) compared to 15% among women aged 35-39. Analysis by country shows that the relationship between age and HIV is not significant in Kenya and in Zimbabwe. HIV prevalence among adolescents in Kenya (7.5%) is only 24% lower than the national average (9.9%). Likewise, in Zimbabwe HIV prevalence is estimated at 16.6%, whereas the national prevalence is estimated at 18.2%. In parallel, age differences in HIV prevalence are statistically significant in other countries.

Considering marital status, women who are no longer in union (widowed, divorced and separated) had a significantly higher prevalence (more than 20%) compared with those who had never been in a marital union (6%) or those living in union (9%). This pattern is observed in all countries. However, marital status differences in HIV prevalence are not statically significant in Zimbabwe though the prevalence of HIV is estimated at 15% among never married women compared to 21% among divorced and separated.

Findings show also a positive association between number of children ever born and HIV prevalence in all countries. Like for the previous variables (age and marital status), the differences are not statistically significant in Zimbabwe. Regarding the place of residence, HIV prevalence is higher in urban areas compared to rural areas except in Zimbabwe.

With reference to findings from CHAID model, out of the eight independent variables included in the multivariate model, seven are statistically associated with the prevalence of HIV. Female education is not statistically associated with the HIV prevalence in the global model.

Box 1: Summary of Chi-Square Automatic Interaction Detector model

Model components	*Model specification*	*Results*
Dependent variable	HIV status	HIV positive: 10.7%
Independent variables	Country, type of place of residence, Education, wealth index, Marital status, Region of residence, Age groups, Number of unions	Marital status, Region of residence, Number of unions, type of place of residence, Country, Age groups, wealth index
Maximum tree depth	3	3
Minimum number of children in parent node	100	100
Minimum number of children in child node	50	10
Number of nodes	Na	74
Number of terminal nodes	Na	49

The cross-country CHAID analysis revealed that marital status was the best predictor of HIV prevalence, followed by the region of residence, number of unions, place of residence, country, age groups and wealth index. The probability of being HIV-positive is higher for widows (34%) and divorced (20%). HIV prevalence is estimated at 10% among women living in union and 6% among those who never contracted a union. Depending of the marital status category, the models construct 49 HIV risks' profiles from interaction with other variables. Richest widows living in Malawi and Zambia experience higher HIV prevalence (65%). The prevalence of HIV is estimated at 52% among widows aged 15-39 years, who live in Kenya and Mozambique; and at 50% among Malawian and Zambian widows living in the 4th and 3rd quintile households. Furthermore, findings indicate that the prevalence of HIV is estimated at 40% among never-married-women aged 35-44 years old living in Mozambique and Zambia as well as among remarried women living in Mozambique and Zambia; and among women living in Uganda' Central, mid-Northern and South Western regions. By contrast, HIV prevalence is below 1 among women in union living in Zanzibar (Tanzania).

Discussions and Conclusion

This paper aimed to describe demographic and socio-economic determinants of HIV prevalence among women in seven East Africa countries. Analyses suggested three keys findings that could be summarized as follow. Firstly, marital status is the best predictor of HIV status among women. Consistent with previous studies (Magadi & Desta, 2011; Adair, 2007), HIV prevalence is higher among women who are no longer in union. This probably because: (1) a rich husband or a male partner may have more access to transactional sex and other risk behaviors which may increase women's vulnerability to HIV; (2) wealthier HIV positive widowed might have better quality of life as well as better access to treatment and survive longer; (3) Widows, divorced and separated might be involved in informal risk sexual relationship as survival strategies. However, the cross-sectional nature of the DHS data does not allow determining the direction of the relationships.

Secondly, these findings might raise the ethical, legal, cultural and dispassionate discussions on polygamy and commercial sexual works. Stigmatization of formal commercial sexual workers and polygamy leads to hiding and informal sexual relationships. People involved in

such informal relationships might not use the condom under the hypothetic assumption of faithfulness, though they might have multiple/ concurrent partners. Indeed, polygyny and commercial sexual work are considered as harmful cultural practices in the majority of policy discourses, especially among the most educated people living in urban areas. Instead, they are involved in informal relationships. Results from existing studies support that polygamist union systems impede the spread of HIV though polygamy did not seem to deter respondents from illicit relationships. Therefore, infidelity and not polygamy necessarily, seemed to be a factor exacerbating the spread of HIV among respondents. Ongoing HIV and AIDS education is suggested for participants who took part in this study, especially with regards to matters of gender inequality (Lungile Nyathikazi, 2013).

In the light of these findings, it is noteworthy that to achieve zero new infection one of HIV eradication strategy and harness the demographic dividend, interventions should be targeted and prioritized according to the prevalence and demographic size of different risk groups. Majority of HIV programs focus on the commercial sexual workers because they are easily identifiable. By opposite, the survival sexual transaction women, including unmarried women (25-49) seem to be ignored because of stigmatization of polygamy in the context of modernity. In the same way scientists and human right activists are fighting for legalization of abortion, free polygamy might contribute to controlling for sexual network and curb HIV transmission.

Table 1 – Description of the sample

	Kenya		Malawi		Mozambique		Tanzania		Uganda		Zambia		Zimbabwe		Total	
Characteristics	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*
Age																
15-19	8.8	293	11.6	744	15.2	1,313	11.5	1,675	22.8	4,453	22.2	3,536	9.2	507	16.9	12,521
20-24	22.4	743	20.8	1,327	19.6	1,694	18.1	2,640	17.9	3,499	18.6	2,958	20.3	1,117	18.9	13,978
25-29	19.3	641	21.9	1,402	18.2	1,580	18.0	2,631	16.4	3,206	17.3	2,749	21.5	1,182	18.1	13,391
30-34	16.2	534	15.6	1,001	15.5	1,340	15.3	2,231	13.2	2,576	14.8	2,363	16.6	916	14.8	10,961
35-39	12.9	427	12.7	814	12.8	1,113	15.4	2,247	12.5	2,437	12.0	1,919	13.9	765	13.1	9,722
40-44	10.3	340	9.1	579	9.3	802	12.2	1,781	9.2	1,798	8.9	1,421	9.9	542	9.8	7,263
45-49	10.1	335	8.3	528	9.4	814	9.5	1,393	8.0	1,559	6.2	994	8.6	471	8.2	6,094
Marital status																
Never	16.0	528	7.5	484	17.8	1,540	18.7	2,736	29.4	5,745	28.6	4,559	8.9	489	21.8	16,081
In union	71.8	2,379	77.1	4,929	69.4	6,010	71.2	10,387	60.6	11,837	58.8	9,370	73.8	4,061	66.2	48,973
Widowed	4.9	163	4.4	280	3.5	299	2.4	354	2.4	459	3.6	576	7.9	436	3.5	2,567
Divorced/separated	7.3	243	11.0	702	9.3	807	7.7	1,121	7.6	1,487	9.0	1,435	9.4	514	8.5	6,309
Number of unions																
0	15.9	528	7.6	484	17.8	1,540	18.8	2,736	29.4	5,745	28.6	4,559	8.9	489	21.7	16,081
1	77.6	2,570	70.0	4,477	57.8	5,003	61.2	8,938	51.7	10,101	58.5	9,324	78.1	4,294	60.5	44,707
2&+	6.3	210	22.2	1,420	23.3	2,019	19.8	2,896	14.3	2,793	12.8	2,042	13.0	717	16.4	12,097
DKN	0.2	5	0.2	14	1.1	94	0.2	28	4.6	889	0.1	15	0.0	0	1.4	1,045
Place of residence																
Urban	29.8	986	13.1	837	47.2	4,086	22.4	3,271	20.6	4,018	47.5	7,579	34.9	1,922	30.7	22,699
Rural	70.2	2,327	86.9	5,558	52.8	4,570	77.6	11,327	79.4	15,510	52.5	8,361	65.1	3,578	69.3	51,231
Education																
None	15.5	512	16.6	1,060	19.7	1,703	15.8	2,302	10.4	2,039	8.2	1,294	2.9	161	12.3	9,071
Primary	52.9	1,753	66.4	4,246	57.0	4,934	66.6	9,730	58.2	11,358	47.4	7,559	32.2	1,769	55.9	41,349
Secondary&+	31.6	1,048	17.0	1,089	23.3	2,019	17.6	2,566	31.4	6,131	44.4	7,078	64.9	3,570	31.8	23,501
Wealth Index																
Poorest	20.4	677	19.0	1,215	12.0	1,042	17.2	2,517	18.9	3,688	17.5	2,789	19.9	1,093	17.6	13,021
Poorer	16.3	539	20.6	1,319	16.1	1,390	18.7	2,733	18.8	3,671	18.5	2,958	17.9	984	18.4	13,594
Middle	16.1	532	20.9	1,334	18.5	1,598	19.8	2,881	18.4	3,590	21.6	3,440	18.0	993	19.4	14,368
Richer	19.3	639	20.7	1,323	21.7	1,883	21.9	3,201	19.0	3,715	21.1	3,358	22.9	1,257	20.8	15,376
Richest	27.9	926	18.8	1,204	31.7	2,743	22.4	3,266	24.9	4,864	21.3	3,395	21.3	1,173	23.8	17,571
Total	100.0	3,313	100.0	6,395	100.0	8,656	100.0	14,598	100.0	19,528	100.0	15,940	100.0	5,500	100.0	73,930

Sources: Kenya 2008-09 DHS; Malawi-2010 DHS; Mozambique 2009 AIS; Tanzania 2011-12 AIS; Zambia 2013-14DHS; Zimbabwe 2010-11DHS.

Table 2 – Prevalence of HIV among women of reproductive age (15-49) by selected background characteristics in seven East African Countries

	Kenya		Malawi		Mozambique		Tanzania		Uganda		Zambia		Zimbabwe		Overall	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
Age				**		**		**		**		**				**
15-19	7.5	293	5.0	744	5.6	1,313	1.4	1,675	2.2	4,453	5.0	3,536	16.6	507	4.1	12,521
20-24	7.8	743	6.9	1,327	11.9	1,694	3.3	2,640	5.0	3,499	11.9	2,958	16.0	1,117	8.2	13,978
25-29	11.1	641	12.4	1,402	16.6	1,580	4.9	2,631	7.4	3,206	15.7	2,749	19.2	1,182	11.4	13,391
30-34	12.0	534	19.8	1,001	16.9	1,340	7.8	2,231	9.9	2,576	19.0	2,363	19.5	916	14.1	10,961
35-39	11.0	427	21.4	814	15.8	1,113	7.2	2,247	10.7	2,437	23.9	1,919	20.0	765	14.7	9,722
40-44	11.2	340	18.7	579	14.6	802	7.0	1,781	10.7	1,798	23.3	1,421	18.1	542	13.9	7,263
45-49	8.1	335	16.9	528	15.2	814	7.3	1,393	9.9	1,559	19.0	994	17.2	471	12.6	6,094
Marital status		**		**		**		**		**		**				**
Never in union	8.0	528	7.9	484	7.5	1,540	2.9	2,736	2.7	5,745	9.1	4,559	15.3	489	5.7	16,081
Union	7.5	2,379	10.7	4,929	12.4	6,010	4.8	10,387	7.1	11,837	14.1	9,370	18.3	4,061	9.9	48,973
Widowed	40.5	163	50.4	280	36.8	299	22.3	354	30.1	459	46.5	576	17.0	436	34.1	2,567
Divorced/separated	16.9	243	23.9	702	26.4	807	13.0	1,121	15.9	1,487	26.6	1,435	21.4	514	20.5	6,309
Number of unions		**		**		**		**		**		**				**
0	8.0	528	7.9	484	7.5	1,540	2.9	2,736	2.7	5,745	9.1	4,559	15.3	489	5.7	16,081
1	9.4	2,570	10.2	4,477	13.7	5,003	4.9	8,938	7.5	10,101	14.4	9,324	18.7	4,294	10.6	44,707
2&+	21.0	210	26.5	1,420	18.3	2,019	9.6	2,896	13.9	2,793	30.6	2,042	17.3	717	18.2	12,097
DKN	0.0	5	14.3	14	11.7	94	7.1	28	8.0	889	20.0	15	18.2	5,500	8.5	1,045
Place of residence		**		**		**		**		**		**				**
Urban	12.5	986	25.8	837	16.4	4,086	8.3	3,271	8.6	4,018	20.4	7,579	18.4	1,922	15.5	22,699
Rural	8.8	2,327	11.8	5,558	11.2	4,570	4.7	11,327	6.6	15,510	10.1	8,361	18.1	3,578	8.6	51,231
Education		**		**		**		**		**		**				**
None	6.1	512	13.9	1,060	11.7	1,703	4.7	2,302	8.6	2,039	13.1	1,294	19.9	161	9.5	9,071
Primary	11.4	1,753	12.8	4,246	14.6	4,934	6.2	9,730	7.6	11,358	14.0	7,559	16.8	1,769	10.4	41,349
Secondary&+	9.2	1,048	16.6	1,089	13.0	2,019	3.3	2,566	5.4	6,131	16.4	7,078	18.8	3,570	11.9	23,501
Wealth Index		**		**		**		**		**		**				**
Poorest	6.8	677	10.3	1,215	6.8	1,042	4.4	2,517	6.2	3,688	9.4	2,789	16.9	1,093	7.9	13,021
Poorer	11.9	539	10.9	1,319	9.2	1,390	4.6	2,733	6.1	3,671	10.2	2,958	17.2	984	8.5	13,594
Middle	8.8	532	11.6	1,334	10.1	1,598	5.5	2,881	6.7	3,590	15.9	3,440	19.5	993	10.5	14,368
Richer	9.2	639	14.3	1,323	17.8	1,883	5.8	3,201	7.9	3,715	20.0	3,358	18.7	1,257	12.8	15,376
Richest	12.0	926	21.5	1,204	17.7	2,743	6.7	3,266	8.0	4,864	17.8	3,395	18.6	1,173	13.0	17,571
Total	9.9	3,313	13.6	6,395	13.6	8,656	5.5	14,598	7.0	19,528	15.0	15,940	18.2	5,500	10.7	73,930

Note: ** p<0.05. Sources: Kenya 2008-09DHS; Malawi-2010DHS; Mozambique 2009AIS; Tanzania 2011-12AIS; Zambia 2013-14DHS; Zimbabwe 2010-11DHS.

Table 3 – Description of HIV prevalence groups: Findings from the CHAID model

Category	%HIV+	% contrib.	N
• Widowed women living in Malawi & Zambia in Richest households	65.0	1.5	180
• Widowed women living in Kenya & Mozambique aged 15-19 & 25-39	51.8	1.3	195
• Widowed women living in Malawi & Zambia in middle and richer households	49.9	2.2	349
• Have never been in union, aged 35-44 and living in Mozambique and Zambia	41.2	0.5	102
• Women in union 2nd or + union - living in Gaza & Maputo provincia (Mozambique)	40.4	1.0	188
• Widowed women living in the Uganda provinces of Mid-Northern; South Western; Central 1 & Central 2	39.8	1.0	196
• Widowed women living in Malawi & Zambia in Poorest and Poorer households	36.1	1.5	327
• Widowed women living in Kenya & Mozambique aged 20-24 & 40-44	35.3	0.6	139
• Divorced and separated women living in urban areas in Malawi, Mozambique, Zambia	33.3	5.3	1,252
• Women in their first union, living in Gaza & Maputo provincia (Mozambique)	31.9	3.2	790
• Have never been in union aged 30-34 & 45-49 and living in Malawi and Zambia	26.2	0.5	164
• Women in their second or higher union, living Iringa (Tanzania); Eastern & Northern (Zambia)	26.0	1.5	450
• Women in their second or higher union, living in Southern (Malawi); Sofala & Zambezia (Mozambique); Central, Southern & Luapula (Zambia); Bulawayo (Zimbabwe)	25.2	5.2	1,624
• Widowed women living in Mid-Wester; Kampala; East Central; Mid-Eastern; North East; West Nile (Uganda)	22.8	0.8	263
• Women in union living in Urban areas of Nyanza (Kenya); Manica (Mozambique); Njombe (Tanzania); Mashonaland West, Matabeleland North, Mashonaland central & Masvingo (Zimbabwe)	21.6	1.7	638
• Women in first union, living in Gaza & Maputo provincia (Mozambique)	20.9	1.4	536
• Divorced and separated women living in urban areas in Kenya, Tanzania, Uganda, Zimbabwe	20.8	2.5	966
• Divorced and separated women living in rural areas in Malawi, Mozambique, Zambia	20.6	5.2	2,009
• Have never been in union aged 25-29 and living in Zambia & Zimbabwe	20.4	0.9	367
• Widowed women living in Kenya & Mozambique aged 45-49	20.3	0.3	128
• Widowed women living in Tanzania & Zimbabwe	19.4	1.9	790
• Women in first union living in Maputo Cidade (Mozambique); Western, Lusaka & Copperbelt (Zambia); Manicaland, Harare, Mashonaland East, Midlands & Matabeleland South (Zimbabwe)	17.3	9.5	4,376
• Women in further union (2nd or +) living in Western & Nairobi (Kenya), Cabo Delgado & Inhambane (Mozambique), Mbeya (Tanzania), Kampala & Central (Uganda) and Muchinga (Zambia)	17.0	2.6	1,207
• Women in union living in rural areas of Nyanza (Kenya); Manica (Mozambique); Njombe (Tanzania); Mashonaland West, Matabeleland North, Mashonaland central & Masvingo (Zimbabwe)	15.3	4.4	2,300
• Have never been in union aged 35-39 or 40-44 and living in Kenya, Malawi, Tanzania, Uganda & Zimbabwe	15.2	0.5	263
• Women in their second or higher union, living in Central & Northern (Malawi); Tete (Mozambique); Dar Es Salaam, Shinyanga, Katavi, Rukwa & Ruvuma (Tanzania); Mid-Northern, Southwestern, Mid-Western, Central & Northwestern (Uganda)	14.7	3.9	2,126
• Divorced and separated women living in rural areas in Kenya & Uganda	14.3	2.3	1,269
• Have never been in union aged 15-19 and living in Zimbabwe	13.5	0.3	170
• Have never been in union aged 25-29 and living in Kenya, Malawi & Mozambique	13.4	0.4	261
• Have never been in union aged 20-24 and living in Malawi, Zambia & Zimbabwe	12.8	2.2	1,378
• Have never been in union aged 30-34 & 45-49 and living in Kenya, Mozambique, Tanzania, Uganda, Zimbabwe	12.5	0.7	441

Table 3 – Description of HIV prevalence groups: Findings from the CHAID model

Category	%HIV+	% contrib.	N
• Women in first union and living in Southern (Malawi); Sofala & Zambezia (Mozambique); Central, Southern & Luapula (Zambia); Bulawayo (Zimbabwe)	10.8	6.9	5,109
Divorced and separated women living in rural areas in Tanzania	10.3	1.1	813
• Women in further union (2nd or+) and living in Coastal, Central & Rift Valley (Kenya), Tabora, Pwani, Geita (Tanzania), East Central & North East (Uganda).	9.8	1.4	1,156
• Women in their first union, living Iringa (Tanzania); Eastern & Northern (Zambia)	9.1	2.3	2,043
• Women in first union and living in Western province & Nairobi (Kenya), Cabo Delgado & Inhambane (Mozambique), Mbeya (Tanzania), Kampala & Central (Uganda), Muchinga (Zambia)	7.7	3.5	3,586
• Have never been in union aged 20-24 and living in Kenya & Mozambique	7.6	0.6	671
• Women in further union (2nd or+) and living in Nampula (Mozambique); Lindi, Simiyu, Kagera, Mara, Singida, Mwanza, Mitwara & Arusha (Tanzania); Mid-Eastern & West Nile (Uganda)	6.9	1.7	1,928
• Women in their first union, living in Central & Northern (Malawi); Tete (Mozambique); Dar Es Salaam, Shinyanga, Katavi, Rukwa & Ruvuma (Tanzania); Mid-Northern, Southwestern, Mid-Western, Central & Northwestern (Uganda)	6.0	6.4	8,527
• Have never been in union aged 25-29 and living in Tanzania & Uganda	5.1	0.5	708
• Women in further union (2nd or+) and living in Northeast & East (Kenya), Niassa (Mozambique), Manyara, Kilimanjaro, Morogoro & Tanga (Tanzania).	4.9	0.2	324
• Have never been in union aged 15-19 and living in Kenya, Malawi, Mozambique & Zambia	4.6	2.5	4,246
• Women in first union and living in Coastal, Central & Rift Valley (Kenya), Tabora, Pwani, Geita (Tanzania), East Central & North East (Uganda).	4.1	1.9	3,601
• Women in first union and living in Nampula (Mozambique); Lindi, Simiyu, Kagera, Mara, Singida, Mwanza, Mitwara & Arusha (Tanzania); Mid-Eastern & West Nile (Uganda)	3.0	1.6	4,372
• Have never been in union aged 20-24 and living in Tanzania & Uganda	2.6	0.8	2,333
• Women in first union and living in Northeast & East (Kenya), Niassa (Mozambique), Manyara, Kilimanjaro, Morogoro & Tanga (Tanzania).	2.0	0.5	2,052
• Have never been in union aged 15-19 and living in Tanzania & Uganda	1.7	1.1	4,977
• Women in union and living in Kigoma, Mjini & Dodoma (Tanzania)	1.0	0.1	968
• Women in union and living in Kaskazini Pemba, Kusini Pemba, Kusini & Kaskazini (Tanzania)	0.3	0.0	1,072

Sources: Kenya 2008-09DHS; Malawi-2010DHS; Mozambique 2009AIS; Tanzania 2011-12AIS; Zambia 2013-14DHS; Zimbabwe 2010-11DHS.