USAID
FROM THE AMERICAN PEOPLE

DHS WORKING PAPERS

HIV Status and Age at First Marriage among Women in Cameroon

Tim Adair

2007 No. 33

DEMOGRAPHIC AND HEALTH RESEARCH

March 2007

This document was produced for review by the United States Agency for International Development.

HIV Status and Age at First Marriage among Women in Cameroon

Tim Adair

Macro International Inc.

March 2007

Corresponding author: Tim Adair, Macro International Inc., 11785 Beltsville Drive, Suite 300, Calverton, MD, USA 20705. Phone (301) 572 0448, Fax: (301) 572 0994, Email: tim.adair@orcmacro.com

Abstract

Recent research has highlighted the risk of HIV infection for married teenage women compared with their unmarried counterparts (Bruce and Clark, 2003; Clark, 2004). This study examines for post-adolescent women age 20-29 in Cameroon whether a relationship exists between HIV status and age at first marriage, or the length of time between first sex and first marriage. Multivariate analysis using the nationally representative sample from the 2004 Cameroon Demographic and Health Survey shows that late-marrying women and those with a longer period of premarital sex have the highest risk of contracting HIV. Although, overall, women in urban areas marry later than their rural counterparts, the positive relationship between HIV risk and age at marriage is stronger in rural areas. For late-marrying women, living in households with higher wealth status and having a larger number of lifetime sexual partners contribute to higher HIV risk. Given that age at first marriage and the gap between first marriage and first sex have increased in recent years, focusing preventive efforts on late-marrying women will be important in reducing HIV prevalence among females.

Introduction

Young women in sub-Saharan countries have consistently been found to have greater risk of contracting HIV than their male counterparts (Glynn et al., 2001; Gregson et al., 2002; Laga et al., 2001). Although findings in various cities have shown that married teenage women are at particularly high risk of HIV infection, more recently studies indicate that women who marry late may have increased risk of infection because of the longer period between first sex and first marriage (Bongaarts, 2006; Clark, 2004; Glynn et al., 2001). This paper uses data from the 2004 Cameroon Demographic and Health Survey (CDHS) to test whether the risk of HIV infection for post-adolescent women age 20-29 is positively related to age at first marriage or the number of years between first sex and first marriage (INS and ORC Macro, 2006).

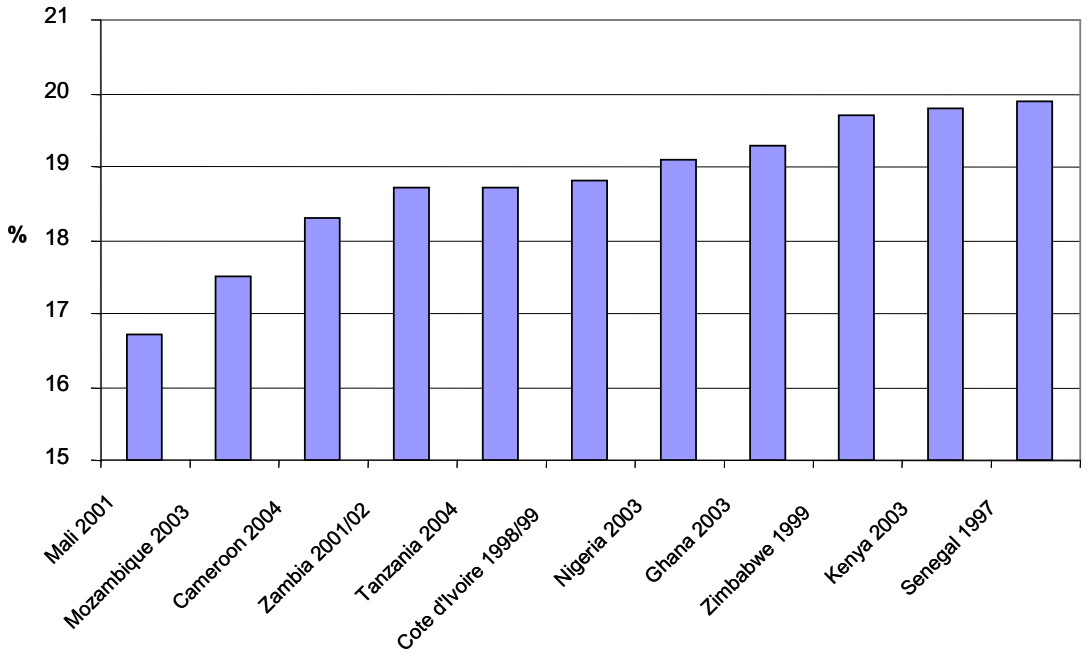
A number of studies have highlighted married adolescent women's risk of HIV infection in sub-Saharan Africa. Findings from cities in Cameroon, Kenya, and Zambia show that married teenage women are more likely to be HIV-positive than unmarried women (Clark, 2004; Glynn et al., 2001; Lydie et al., 2001). It is suggested that married adolescent women in sub-Saharan Africa are more vulnerable to HIV infection than unmarried women because sexual initiation occurs earlier and there is greater frequency of sexual intercourse with their husband, who is more likely to be older and HIV-positive than the partners of unmarried women. Also, these young married women may use condoms more rarely because of a lack of bargaining power in their marriage (Bruce and Clark, 2003; Clark, 2004; Clark et al., 2006). Research in rural Malawi has shown that the husbands of HIV-positive women are more likely to be HIV-positive. Research in rural Uganda indicates that husbands ten or more years older than their wives are especially likely to be HIV positive (Bracher et al., 2003; Kelly et al., 2003). Analysis showing a negative correlation between high median age at first marriage and HIV prevalence in four sub-Saharan cities also supports the greater risk of infection in early marriage (Ferry et al., 2001).

In contrast, Bongaarts (2006) has used national-level data to show that higher median age at marriage is positively associated with HIV prevalence. His analysis of 33 sub-Saharan countries used national-level HIV prevalence data from UNAIDS—primarily from the testing of pregnant women in antenatal clinics—and age at marriage data from DHS surveys. Individual-level analyses of Kenya and Ghana by Bongaarts (2006) using HIV data from DHS (controlling for age, residence, and education), show that the length of time between first sex and first marriage more strongly predicts HIV infection than the interval after first marriage. This finding suggests that late age at marriage increases HIV risk primarily because of the longer period of premarital

sex. Other research by Hargreaves et al. (2002) in the city of Kisumu, Kenya found that women age 15-24 who first marry after age 17 have a higher risk of HIV than those marrying earlier. A review by Slaymaker (2004) suggests that the risk of HIV does not vary by age at first sex; the relationship was found not significant in each of seven different studies.

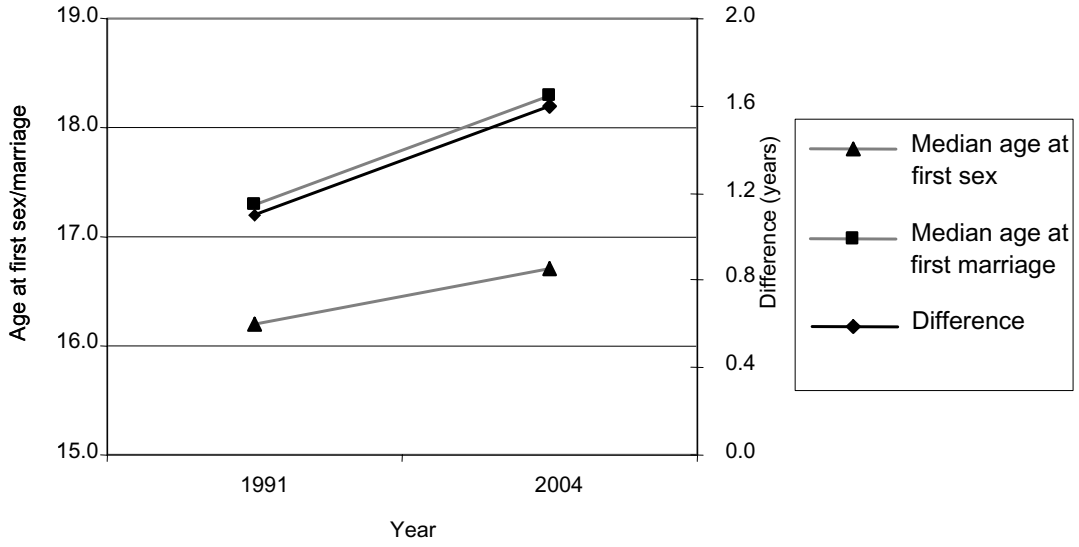
Analysis of the relationship between HIV risk and age at marriage is important in Cameroon. Figure 1 shows that nationwide, women marry at a younger age—median age at first marriage is

Figure 1 Median age at first marriage among women age 20-24, selected DHS surveys in sub-Saharan Africa



18.3 years—than in many other sub-Saharan countries where HIV is more prevalent, such as Zambia, Zimbabwe, and South Africa. However, a trend toward older age at marriage is evident in Cameroon. Figure 2 shows that the median age at marriage rose from 17.3 years in 1991 to 18.3 years in 2004. There was a smaller increase in the median age at first sex over the same period from 16.2 years to 16.7 years, resulting in an increase in the length of time between first sex and first marriage of 1.1 to 1.6 years. If there is a positive relationship between HIV risk and age at first marriage, a continuation of this trend in the future will emphasize the need to focus prevention efforts on women who marry late.

Figure 2 Median age at first sex, median age at first marriage, and the difference (years), women age 20-24, Cameroon 1991 and Cameroon 2004



Cameroon has experienced a sharp increase in HIV prevalence since the early 1990s. The median HIV prevalence rate among pregnant women at antenatal clinics in major urban areas rose from 1.8% in 1992 to 7.0% in 2002 (UNAIDS and WHO, 2006). In the 1980s and early 1990s Cameroon had a low HIV prevalence rate compared with neighboring countries (Mbopi-Keou et al., 1998). Data from the 2004 CDHS shown in Table 1 indicates that, like other sub-Saharan countries, young women in Cameroon have far higher HIV prevalence than their male counterparts. The prevalence rate for women is over three times that of men for ages 15-19 and 20-24, and is more than double for the 25-29 age group. Only in the 35-39 age group do men have higher HIV prevalence than women.

Table 1 HIV prevalence rate by sex and age group, Cameroon 2004

Age group	Males	Females	Total
15-19	0.6	2.2	1.4
20-24	2.5	7.9	5.5
25-29	5.1	10.3	7.8
30-34	8.3	9.4	8.9
35-39	8.6	7.8	8.2
40-44	5.6	6.0	5.8
45-49	3.8	5.5	4.7
Total	4.1	6.8	5.5

Note: Weighted cases.
Source: INS and ORC Macro (2004)

Examining the association between HIV status and age at first marriage in Cameroon must take into account the large regional differences within the country. The population in the Northern region is predominantly poor, Muslim, and has little education, compared with the wealthier and predominantly Christian Central region. Because previous studies have been limited to large cities, the analysis of individual nationally-representative data in the 2004 CDHS is important to gain insights into the relationship between HIV and age at first marriage across all regional and socioeconomic groups. This is particularly important if there are regional and socioeconomic differences in age at first marriage.

Data and Methodology

The 2004 CDHS is a nationally-representative two-stage sample survey, and the first CDHS to conduct HIV testing. A total of 10,656 women were interviewed, with a response rate of 94.3%.[1] The HIV testing was done on respondents who voluntarily provided blood samples after being informed of procedures, confidentiality, and VCT services. The dried blood spot (DBS) samples were then tested in a laboratory. Of the 5,703 women age 15-49 eligible for testing, 7.9% did not provide an HIV sample (5.4% refused to be tested: 8.5% in urban areas and 2.3% in rural areas). The CDHS has the advantage of having detailed sociodemographic information on married couples that is anonymously linked to the HIV data. This information allows for quantitative examination of the relationship between HIV status and age at marriage. Age at marriage in the

[1] Further details on sample size and response rates are available in the 2004 Cameroon DHS final report (INS and ORC Macro, 2004).

CDHS is the age when a woman first began living with a husband or consensual partner.[2] Hence, the analysis covers both currently married and cohabiting women.[3]

The multivariate analysis is conducted with logistic regression analysis using STATA, applying HIV weights and adjusting standard errors for sample clustering (StataCorp, 2003). The outcome variable is a woman's HIV status.[4] To account for women that marry in their twenties, only currently married women age 20-29 are analyzed. The two primary explanatory variables under examination are age at first marriage and the number of years between first sex and first marriage. Age at first marriage is categorized as 16 years and under, 17-19 years, and 20 years and over. Age at first sex is also included in models with age at first marriage to determine if it has an independent relationship with HIV risk. A variable measuring the number of years between first sex and first marriage is included separately in other models; it is computed using age at first sex and age at first marriage and provides a different perspective on the relationship of these factors with HIV risk. The multivariate results initially present the findings for each of these variables controlling just for age; these models are conducted for all Cameroon, separately for urban and rural areas, and separately for women age 20-24 and 25-29, to account for variations in the relationship with HIV status by residence and age.

Further control variables are included to see if any relationship of HIV risk with age at first marriage or length of premarital sexual activity is explained by socioeconomic or regional factors, or if the association is independent of these factors. The next model includes urban-rural residence and level of education. The following model includes region of residence[5] and household wealth quintile,[6] to examine their effect while controlling for urban-rural residence, level of education, and religion. The final model retains urban-rural residence and household wealth quintile and adds the behavioral factors of number of lifetime sexual partners and use of a condom at last sex in the previous 12 months. Given that the number of years between first sex

[2] Age at first marriage is computed from two separate questions: the date first began living with husband or consensual partner, and date of birth.
[3] From here on cohabiting women are referred to as "currently married."
[4] Only those women that received a conclusive test result (i.e., either HIV-positive or HIV-negative) and completed an interview are included.
[5] Regions: Central (Centre, Douala, Littoral, Yaounde); Southern/Eastern (South, East); Western (Northwest, West); Northern (Adamaoua, Extreme North, North).
[6] Household wealth quintile is computed from a wealth index that measures a household's ownership of durable assets. Rutstein and Johnson (2004) describe the methodology for calculating the index.

and first marriage is computed from the age at first marriage variables included in other models, the results from the control variables will be similar.[7]

Before the multivariate results are presented, evidence of differences in age at first marriage by socioeconomic status and residence in Cameroon are presented. Differences in mean age at first sex and number of lifetime partners are then shown for each category of age at first marriage. Following this, HIV prevalence by marital status within each age group in Cameroon is presented. The univariate and bivariate results for each variable included in the multivariate analysis are then shown.

Results

Table 2 shows that in Cameroon a woman's age at first marriage varies substantially by socioeconomic status. Women from poorer households, Muslim women, women with little education, and those residing in rural areas or in the Northern region, are more likely to marry early than other women—66.9% of women in households in the poorest wealth quintile first married at age 16 or under, compared with only 21.9% of those in the richest quintile. A similar difference exists between women with no education or incomplete primary (68.8%) and those with incomplete secondary or higher (26.7%), as well as for Catholics (35.8%) and Muslims (75.1%). In the Northern region 72.2% of currently married women age 20-29 first married at age 16 and under, compared with 23.7% of women in the Central region, which includes the large urban centers of Yaounde and Douala. To interpret these regional differences, it should be noted that the population in the Northern region is predominantly poor, Muslim, and has little education, compared with the wealthier and predominantly Christian population in the Central region. In contrast to the characteristics of women who marry early, HIV prevalence in sub-Saharan Africa is higher among the wealthier, urban population (Garcia-Calleja et al., 2006; Mishra et al., 2007).

[7] Differences will be due to age at first marriage being measured using a categorical variable, but the computation of years between first sex and first marriage treating it as a continuous variable.

Table 2 Household wealth quintile, education, religion, residence, and region by woman's age at first marriage, currently married women age 20-29 years, Cameroon 2004

Variable	16 years and under	17-19 years	20 years and above	Total	N
Household wealth quintile					
Lowest	66.9	26.1	7.1	100.0	316
Second	61.3	24.6	14.1	100.0	290
Middle	51.6	30.1	18.3	100.0	275
Fourth	38.9	34.9	26.2	100.0	295
Highest	21.9	32.0	46.2	100.0	305
Education					
None or primary incomplete	68.8	22.8	8.5	100.0	702
Primary complete	34.6	38.3	27.1	100.0	270
Secondary incomplete or higher	26.7	34.1	39.2	100.0	509
Religion					
Roman Catholic	35.8	35.1	29.1	100.0	540
Protestant	41.1	31.1	27.8	100.0	465
Muslim	75.1	18.0	6.9	100.0	309
Other	58.1	27.9	14.0	100.0	164
Residence					
Urban	38.3	32.0	29.8	100.0	739
Rural	57.8	27.1	15.1	100.0	742
Region					
Central	23.7	36.6	39.7	100.0	412
Southern/Eastern	45.2	30.4	24.4	100.0	135
Western	43.1	31.9	25.0	100.0	415
Northern	72.2	21.7	6.1	100.0	519
Total	48.1	29.5	22.4	100.0	1,481

Note: Weighted cases. Only women who received a conclusive HIV test included.
Source: INS and ORC Macro (2004)

Age at first marriage also varies by sexual behavior (see Table 3). Mean age at first sex increases markedly with age at marriage; it is 14.6 years for women marrying at age 16 and under, compared with 16.8 years for those marrying at age 17-19, and 17.3 years for those marrying at age 20 and above. Women that marry earlier initiate sexual intercourse at a younger age, but have a substantially lower number of reported lifetime sexual partners than those marrying later. Slightly more than half of women that married at age 16 and under report only one lifetime partner, while 69.1% of those married at age 20 and above report three or more partners. Women

marrying in their twenties have, on average, a longer period of premarital intercourses and a greater number of partners than women marrying earlier.

Table 3 Age at marriage by mean age at first sex and number of lifetime partners, currently married women age 20-29, Cameroon 2004

Age at marriage	Mean age at first sex	Number of lifetime partners			
		1	2	3+	Total
16 years and under	14.6	52.7	20.3	27.0	100.0
17-19 years	16.8	33.3	20.6	46.1	100.0
20 years and above	17.3	16.2	14.7	69.1	100.0
Total	15.8	38.8	19.1	42.0	100.0

Note : Only women who received a conclusive HIV test included.
Source: INS and ORC Macro (2004)

HIV prevalence by marital status within each age group is presented in Table 4. Married women aged 15-19 years have a higher HIV prevalence than never married women, but this difference is not significant. At ages 20-24 and 25-29, a higher proportion of never married women are HIV-positive compared with currently married women. Again, this difference is not significant. Formerly married women have a much higher level of HIV prevalence, possibly because many had husbands that died from AIDS.

Table 4 HIV status among women age 15-29 who have ever had sexual intercourse, by age and marital status, Cameroon 2004

Age group	Marital status	HIV-positive women (%)	N	Chi-square p-value*
15-19	Never married	2.0	295	
	Currently married	3.8	400	0.486
	Formerly married	5.6	35	
	Total	3.2	730	
20-24	Never married	9.4	176	
	Currently married	7.1	762	0.526
	Formerly married	14.2	75	
	Total	8.0	1,014	
25-29	Never married	10.3	58	
	Currently married	9.6	711	0.251
	Formerly married	19.0	51	
	Total	10.5	839	

Note: Weighted cases.
* Chi-square test conducted of never married women versus currently married women.
Source: INS and ORC Macro (2004)

Table 5 shows the univariate and bivariate statistics for the variables included in the multivariate analysis of HIV status for currently married women age 20-29. Age at first marriage has a strong positive relationship with HIV status. The prevalence for women married at age 16 or younger (5.7%), which includes about half of the women in the analysis, is less than half that of those married at age 20 or older (13.4%). Women living in rural areas are much less likely to be HIV positive than those in urban areas. Age at first marriage is not significantly related with HIV status within urban areas. However, in rural areas there is a substantial difference between those married in their teens (age 16 and under: 4.0%, age 17-19: 4.4%) and those married at age 20 and older (13.1%). The mean age at first sex does not differ significantly by whether a woman is infected in any of the analysis groups. The length of the period between first sex and first marriage is, however, significantly higher for HIV-positive women than HIV-negative women for each group except urban women. In rural Cameroon, the mean number of years between first sex and first marriage is 2.1 for HIV-positive women compared with 0.8 for HIV-negative women. Of the control variables, level of education and especially household wealth quintile are associated with HIV status. HIV prevalence is markedly low for the least educated (5.0%) and poorest women (3.2%). There is also significantly lower HIV prevalence for women in the Northern region (4.6%) compared with those in other regions, and for Muslims (6.4%) and women of other religions (4.1%) compared with Roman Catholic or Protestant women. HIV-positive women have had a significantly higher average number of lifetime partners than HIV-negative women. Use of a condom at last sex is not significantly associated with HIV status.

Table 5 Univariate and bivariate statistics, currently married women age 20-29, Cameroon 2004

Variables	%	HIV+ (%)
Outcome variable		
HIV status		
HIV-positive	8.2	–
HIV-negative	91.8	
Explanatory variables		
Age at first marriage		
16 years and under	48.1	5.7
17-19 years	29.5	8.4
20 years and over	22.4	13.4**
Age at first marriage - all		
16 years and under	38.3	8.4
17-19 years	32.0	11.8
20 years and over	29.8	13.6
Age at first marriage - rural		
16 years and under	57.9	4.0
17-19 years	27.0	4.4
20 years and over	15.1	13.1**
Age at first marriage - 20-24		
16 years and under	50.8	5.5
17-19 years	32.9	7.3
20 years and over	16.3	11.3**
Age at first marriage – 25-29		
16 years and under	45.2	6.0
17-19 years	25.9	9.9
20 years and over	28.9	14.7**
Age at first sex – all		
Mean	15.8	HIV+ = 16.0
Missing (n)	*8*	HIV- = 15.8
Age at first sex – urban		
Mean	16.2	HIV+ = 16.2
Missing (n)	*6*	HIV- = 16.2
Age at first sex – rural		
Mean	15.5	HIV+ = 15.8
Missing (n)	*2*	HIV- = 15.5
Age at first sex – 20-24		
Mean	15.7	HIV+ = 15.4
Missing (n)	*2*	HIV- = 15.8
Age at first sex – 25-29		
Mean	15.9	HIV+ = 16.6
Missing (n)	*6*	HIV- = 15.9
Years between first sex and first marriage – all		
Mean	1.3	HIV+ = 2.1 **
Missing (n)	*8*	HIV- = 1.2
Years between first sex and first marriage – urban		
Mean	1.6	HIV+ = 2.1
Missing (n)	*6*	HIV- = 1.6
Years between first sex and first marriage – rural		
Mean	0.9	HIV+ = 2.1**
Missing (n)	*2*	HIV- = 0.8
Years between first sex and first marriage – 20-24		
Mean	0.9	HIV+ = 1.8*
Missing (n)	*2*	HIV- = 0.8
Years between first sex and first marriage – 25-29		
Mean	1.7	HIV+ = 2.4*
Missing (n)	*6*	HIV- = 1.6
Current age	24.3	HIV+ = 25.0**
Mean		HIV- = 24.2
Residence		
Urban	49.9	11.0
Rural	50.1	5.5**
Education		
None or primary incomplete	47.7	5.0
Primary complete	18.2	9.8
Secondary incomp./higher	34.4	11.8**
Region		
Central	27.8	10.4
Southern/Eastern	9.1	10.5
Western	28.0	9.9
Northern	35.0	4.6**
Household wealth quintile		
Lowest	21.3	3.2
Second-lowest	19.6	3.5
Middle	18.6	10.0
Second-highest	19.9	12.4
Highest	20.6	12.4**
Religion		
Roman Catholic	36.5	10.6
Protestant	31.5	8.5
Muslim	20.9	6.4
Other	11.1	4.1*
Missing (n)	*3*	
Lifetime partners		
Mean	3.0	HIV+ = 4.8 **
Missing (n)	*2*	HIV- = 2.8
Used condom at last sex		
No	89.7	8.2
Yes	10.3	9.3
Missing (n)	*153*	
Total cases	1,481	

Note: p-value is obtained from a chi-square test or, for age and number of lifetime partners, a t-test. Weighted cases. Chi-square tests are conducted for categorical variables and t-tests for continuous variables. For variables with three or more categories, chi-square tests are undertaken to test significance across all categories.
p<0.05 **p<0.01
Source: INS and ORC Macro (2004)

The multivariate analysis of age at first marriage for women age 20-29 in Table 6 shows that, controlling for age at first sex and current age, those women marrying at age 20 and above in Cameroon are more than two-and-a-half times as likely to be HIV positive as those marrying at age 16 and under. This corresponds to Bongaarts' (2006) findings from country-level analysis of sub-Saharan Africa. There is no significant difference between women that married at age 17-19 and age 16 and under. Age at first sex is not significantly associated with HIV status for all women age 20-29, which corresponds to the review by Slaymaker (2004). For the analysis within urban areas, neither age at first marriage nor age at first sex have a significant relationship with HIV status. In contrast, in rural areas there is a strong and significant association; women marrying at age 20 and over are more than three times as likely to be HIV positive as those marrying at 16 and under. There is some difference in the effect of age at marriage by age cohort. For women age 20-24, marrying at age 20 and above more strongly predicts HIV status than for women age 25-29 (20-24 odds ratio=3.49, 25-29 odds ratio=2.25). Furthermore, for women age 20-24, the risk of HIV infection is 20% lower for each year that age at first sex is delayed. There is no such relationship for women age 25-29 years.

Table 6 Multivariate analysis of HIV status, currently married women age 20-29, Cameroon 2004

			Residence				Age			
	All		Urban		Rural		20-24 years		25-29 years	
Variables	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z
Age at first marriage										
16 years and under	Ref		Ref		Ref		Ref		Ref	
17-19 years	1.72	1.86	1.69	1.36	1.23	0.28	2.17	1.85	1.52	1.03
20 years and over	2.69**	3.29	1.96	1.58	3.43**	3.29	3.49**	2.93	2.25*	2.04
Age at first sex	0.95	1.09	0.93	-1.05	0.96	1.93	0.80**	-2.68	1.05	0.88
Current age	1.08*	2.17	1.06	1.29	1.10	1.96	1.18	1.51	1.18	1.75
Number of cases	1,476		630		846		762		714	

* p<0.05 **p<0.01
Source: INS and ORC Macro (2004)

Table 7 shows that for women age 20-29 in Cameroon the number of years between first sex and first marriage is positively related with being HIV positive, controlling for age. For each additional year between age at first sex and age at first marriage, a woman's risk of HIV increases by 10%. This corresponds with Table 6, where age at first marriage for women age 20 or above is positively related to HIV infection but age at first sex is not. The number of years between first sex and first marriage is also positively related to HIV infection among women in rural Cameroon

(15% increase in risk of infection for each additional year) and among women age 20-24 (18% increase in risk of infection for each additional year). There is no relationship with HIV status among women in urban Cameroon, where age at marriage is not associated with being HIV positive, and for women age 25-29.

Table 7 Multivariate analysis of HIV status, currently married women age 20-29 years, Cameroon 2004

			Residence				Age			
	All		Urban		Rural		20-24 years		25-29 years	
Variable	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z
Years between first sex and first marriage	1.10*	2.29	1.05	0.90	1.15**	2.86	1.18*	2.34	1.07	1.45
Current age	1.08*	2.04	1.06	1.16	1.11*	2.15	1.14	1.21	1.19	1.83
Number of cases	1,476		630		846		762		714	

* p<0.05 **p<0.01
Source: INS and ORC Macro (2004)

Table 8 shows that age at first marriage loses much of its predictive power after including the control variables in Models 1 and 2; however, it remains significant. In Model 1, living in a rural area, compared with an urban area, significantly reduces the probability of being infected (odds ratio=0.61). Education level, however, is not significantly related with HIV status, despite the large bivariate difference. In Model 2, household wealth quintile is a strong predictor of HIV status and also reduces the impact of age at first marriage. A woman living in a household that is in the middle, fourth or highest wealth quintile is far more likely to be HIV positive (Middle odds ratio=2.85, Fourth odds ratio=3.64, Highest odds ratio=3.55) than a woman in the lowest wealth quintile. Region and religion have no association with HIV status after controlling for other factors. In Model 3, the number of lifetime partners is significantly related with HIV status. For each additional partner a woman has had sexual intercourse with, she has a 6% greater likelihood of being HIV positive. After the inclusion of these factors, household wealth remains a strong predictor of HIV status. However, age at first marriage is no longer significant.

Table 8 Multivariate analysis of HIV status, currently married women age 20-29, Cameroon 2004

	Model 1		Model 2		Model 3	
Variables	Odds	Z	Odds	Z	Odds	Z
Age at first marriage						
16 years and under	Ref		Ref		Ref	
17-19 years	1.39	1.16	1.44	1.21	1.41	1.13
20 years and over	1.95*	2.22	1.99*	2.23	1.76	1.70
Age at first sex	0.93	-1.29	0.95	-1.52	0.95	-0.82
Current age	1.08*	2.10	1.08*	2.20	1.09*	2.04
Residence						
Urban	Ref		-		Ref	
Rural	0.61*	-2.11			0.94	-0.21
Education						
None or primary incompl.	Ref		-		-	
Primary complete	1.61	1.56				
Secondary incompl./higher	1.69	1.79				
Region						
Central	-		Ref		-	
Southern/Eastern			1.39	1.09		
Western			1.53	1.48		
Northern			1.24	0.56		
Household wealth quintile						
Lowest	-		Ref		Ref	
Second			1.03	-0.23	0.89	-0.23
Middle			2.85**	2.61	2.69**	2.61
Fourth			3.64**	3.25	3.38**	2.92
Highest			3.55**	3.14	2.92*	2.40
Religion						
Roman Catholic	-		Ref		-	
Protestant			0.68	-1.56		
Muslim			0.76	-0.77		
Other			0.41	-1.82		
Number of lifetime partners	-		-		1.06**	2.73
Used condom at last sex						
No	-		-		Ref	
Yes					0.784	-0.70
Number of cases	1,476		1,474		1,317	

* p<0.05 **p<0.01
Source: INS and ORC Macro (2004)

After the introduction of additional control variables in Table 9, the number of years between age at first sex and first marriage no longer significantly predicts HIV risk among women age 20-29 in Cameroon. As expected, the control variables are similar to those in Table 8. The only clear difference in results is that women whose level of education is incomplete secondary or higher

are significantly more likely to be HIV positive (odds ratio=1.75) than women who didn't complete primary school.

Table 9 Multivariate analysis of HIV status, currently married women age 20-29, Cameroon 2004

	Model 1		Model 2		Model 3	
Variables	Odds Ratio	Z	Odds Ratio	Z	Odds Ratio	Z
Years between first sex and first marriage	1.06	1.40	1.06	1.45	1.04	0.98
Current age	1.08	1.95	1.08*	2.02	1.09*	1.91
Residence						
Urban	Ref		-		Ref	
Rural	0.60*	-2.11			0.95	-0.19
Education						
None or primary incompl.	Ref		-		-	
Primary complete	1.66	1.68				
Secondary incompl./higher	1.75*	1.98				
Region						
Central	-		Ref		-	
Southern/Eastern			1.36	1.09		
Western			1.48	1.48		
Northern			1.18	0.46		
Household wealth quintile						
Lowest	-		Ref		Ref	
Second			1.04	0.09	0.91	-0.19
Middle			2.88**	2.60	2.76**	2.65
Fourth			3.64**	3.19	3.54**	2.96
Highest			3.62**	3.12	3.17*	2.53
Religion						
Roman Catholic	-		Ref		-	
Protestant			0.69	-1.54		
Muslim			0.74	-0.84		
Other			0.41	-1.84		
Number of lifetime partners	-		-		1.06**	2.78
Used condom at last sex						
No	-		-		Ref	
Yes					0.79	-0.66
Number of cases	1,476		1,474		1,317	

* p<0.05 **p<0.01
Source: INS and ORC Macro (2004)

Discussion and Conclusion

For currently married women age 20-29 in Cameroon, marriage at age 20 and above predicts a greater likelihood of being HIV positive than marriage at age 16 and under, controlling for age at first sex and current age. Marriage at age 17-19 years, however, does not increase HIV risk. Bongaarts (2006) also found a positive relationship between age at marriage and HIV risk in his country-level analysis of 33 sub-Saharan countries. However, it is important to distinguish these findings from those of Bruce and Clark (2003) and Clark (2004), which indicate that teenage women marrying earlier have a higher risk of HIV. The findings presented in Table 4 show that married teenage women have a higher (but nonsignificant) level of HIV prevalence than never-married women. Analysis of women age 20-29 who have completed adolescence provides a more complete perspective on the risk of HIV for women marrying late.

The higher risk of HIV among late-marrying women is explained by their longer period of premarital sexual intercourse. The positive relationship of the number of years between age at first sex and age at first marriage with HIV risk supports the findings of Bongaarts (2006) in Kenya and Ghana. This finding also corresponds with the model of age at marriage and HIV status for women age 20-29 that shows age at first sex has no significant association with HIV status, which was put forward by Slaymaker (2004). These findings support the hypothesis that late marriage and a longer period of pre-martial sexual intercourse increase a woman's risk of HIV.

The association of HIV with age at first marriage and the length of the period of pre-marital sexual intercourse is stronger in rural than urban areas. This finding is particularly revealing; although late marriage is more common in urban areas, it is associated with relatively high HIV risk in rural areas. Table 5 shows that the HIV prevalence of women in rural areas marrying at age 20 and above is similar to that of women in urban areas marrying at the same age. Rural women marrying in their teens, however, have a far lower HIV risk than their urban counterparts. Early-marrying women in rural areas appear to be more protected from HIV risk than those in urban areas. A clear explanation for these findings is not immediately apparent; perhaps early-marrying women in urban areas are more likely to be infected by their husbands. However, women who marry late and have a longer period of premarital sexual intercourse are at high risk irrespective of where they live. This group in rural areas may include women who are circular migrants moving to and from the city where they may be at risk of contracting infection. The

difference in findings between urban and rural areas is an important demonstration of the benefits of utilizing nationally-representative data.

The relationship of age at first marriage and length of the period of premarital sexual intercourse with HIV risk is stronger for women age 20-24 than women age 25-29, but this difference is not large enough to draw conclusions. However, there is an obvious variation in the results for age at first sex by age cohort. For women age 20-24, those who have sexual initiation later have a lower HIV risk, while for women age 25-29 and all women age 25-29 there is no relationship. This finding suggests there is some cohort change in the association of age at first sex and HIV risk. It may be explained by HIV prevalence growing quickly in the late 1990s, and hence infection levels being high when many of the women age 20-24 in 2004 would have become sexually active. For these women, a delay in the beginning of their sexual lives may have had a protective effect. In contrast, HIV prevalence in Cameroon, and most likely the level of infection as well, remained low in the early 1990s when many women age 25-29 would have had sexual intercourse for the first time. However, if infection levels had risen there would possibly be a positive relationship for age at first sex and HIV risk for women age 25-29. Such conclusions are far from firm. Furthermore, given cohort differences in these findings, it is difficult to postulate as to the effect delays in sexual debut have on HIV risk for women in their twenties.

The findings in Table 2 show the substantial differences in age at marriage by residence and various socioeconomic factors. This explains why the predictive power of age at first marriage is reduced after the introduction of the control variables, and is no longer significant for the length of the period of premarital sex. Urban-rural status and household wealth quintile are the strongest predictors of HIV status; other research has found that HIV prevalence is highest among the wealthier population (Mishra et al., 2006). Household wealth also reduces the predictive strength of other variables that have a bivariate relationship with socioeconomic status, such as region and religion. Education level has no relationship with HIV status in the model of age at first marriage, even without the inclusion of household wealth, although an association exists for the model of the length of the period of premarital sex.

Socioeconomic status and residence do not fully explain the relationship of age at marriage and HIV status; however, the introduction of lifetime number of partners does result in age at marriage no longer being significant. This finding corresponds with the higher number of lifetime partners of women that marry in their twenties compared with those marrying earlier, as shown in

Table 3. This result demonstrates that the higher HIV risk among late-marrying women and those who have a longer period of premarital sex, is somewhat explained by their greater number of partners. Women who married early have a shorter period of premarital sex, a much lower lifetime number of partners, and less HIV risk. In addition to explaining the effect of age at marriage on HIV risk, the finding emphasizes the risks women face by having sexual intercourse with a large number of partners.

The major implication of these findings for policy is the importance of the period of premarital sex on HIV risk. This period, primarily in women's late teens, is when late-marrying women have a higher number of partners than early-marrying women. Specific interventions focusing on women with longer periods of premarital sexual activity should address their number of partners. Furthermore, policy should be tailored to residence; although overall HIV risk is lower and late marriage is less common in rural areas than urban areas. Rural women marrying in their twenties are at relatively greater risk of being infected compared with early-marrying women. The long-term increase in age at marriage and the longer period between first sex and first marriage suggest that in the future a higher proportion of young women will likely remain unmarried during their late teens and have extended premarital sexual lives. Hence, policy measures to protect women during this period from contracting HIV will take on greater importance in years to come.

REFERENCES

Bongaarts, J. 2006. *Late marriage and the HIV epidemic in sub-Saharan Africa*. Working Paper no. 216. New York, NY: Population Council.

Bracher, M., G. Santow, and S. Cotts Watkins. 2003. "Moving" and marrying: Modelling HIV infection among newly-weds in Malawi, *Demographic Research*, Special Collection 1, Article 7, 205-246.

Bruce, J. and S. Clark. 2003. Including married adolescents in adolescent reproductive health and HIV/AIDS policy. Paper prepared for the WHI/UNFPA/Population Council Technical Consultation on Married Adolescents, 9-12 December 2003, WHO, Geneva, Switzerland.

Clark, S. 2004. Early marriage and HIV risks in sub-Saharan Africa. *Studies in Family Planning* 35(3): 149-160.

Clark, S., J. Bruce, and A. Dude. 2006. Protecting young women from HIV/AIDS: The case against child and adolescent marriage. *International Family Planning Perspectives* 32(3): 79-88.

Ferry, B., M. Caraël, A. Buvé, B. Avert, M. Laourou, L. Kanhonou, M. De Loenzien, E. Akam, J. Chege, F. Kaona, and the Study Group on the Heterogeneity of HIV Epidemics in African Cities. 2001. Comparison of key parameters of sexual behavior in four African urban populations with different levels of HIV infection. *AIDS* 15(suppl. 4): S41-S50.

Garcia-Calleja, J.M., E. Gouws, and P.D. Ghys. 2006. National population based HIV prevalence surveys in sub-Saharan Africa: Results and implications for HIV and AIDS estimates. *Sexually Transmitted Infections* 82 (suppl. III): iii64-iii70.

Glynn, J.R., M. Caraël, B. Avert, M. Kahindo, J. Chege, R. Musonda, F. Kaona, A. Buvé, and the Study Group on the Heterogeneity of HIV Epidemics in African Cities. 2001. Why do young women have a much higher prevalence of HIV than young men? A study in Kisumu, Kenya and Ndola, Zambia. *AIDS* 15(suppl. 4): S51-S60.

Gregson, S., C.A. Nyampukapa, G.P. Garnett, P.R. Mason, T. Zhuwau, M. Caraël, S.K. Chandiwana, and R.M. Anderson. 2002. Sexual mixing patterns and sex-differentials in teenage exposure to HIV infection in rural Zimbabwe. *The Lancet* 259(9321): 1896-1903.

Hargreaves, J.R., L.A. Morison, J. Chege, N. Rutenberg, M. Kahindo, H.A. Weiss, R. Hayes, and A. Buve for the Study Group on Heterogeneity of HIV Epidemics in African Cities. 2002. Socioeconomic status and risk of HIV infection in an urban population in Kenya. *Tropical Medicine and International Health* 7(9): 793-802.

Institut National de la Statistique (INS) and ORC Macro. 2004. *Enquête Démographique et de Santé du Cameroun 2004.* Calverton, Maryland, USA : INS and ORC Macro.

Kelly, R., R. Gray, N. Sewankombo, D. Serwadda, F. Wabwire-Mangen, and T. Lutalo. 2003. Age differences in sexual partners and risk of HIV-1 infection in rural Uganda. *Journal of Acquired Immune Deficiency Syndromes* 32(4): 249-258.

Laga, M., B. Schwartlander, E. Pisani, P. Salif Sow, and M. Caraël. 2001. To stem HIV in Africa, prevent transmission to young women. *AIDS* 15(7): 931-934.

Lydie, N., N.J. Robinson, B. Ferry, E. Akam, M. De Loenzien, L. Zekeng, and S. Abega. 2004. Adolescent sexuality and the HIV epidemic in Yaoundé, Cameroon. *Journal of Biosocial Science* 36(5): 597-616.

Mbopi-Keou, F.X., R. Mbu, P. Mauclere, A. Andela, E. Tetanye, R. Leke, G. Chaouat, F. Barre-Sinoussi, P. Martin, and L. Belec. 1998. Antenatal HIV prevalence in Yaounde, Cameroon, *International Journal of STDs and AIDS* 9(7): 400-402.

Mishra, V., S. Bignami, R. Greener, M. Vaessen, R. Hong, P. Ghys, T. Boerma, A. Van Assche, S. Khan, and S. Rutstein. 2007. *A study of the association of HIV infection with wealth in sub-Saharan Africa*. DHS Working Paper no. 31. Calverton, Maryland, USA: Macro International Inc.

Rutstein, S. and K. Johnson. 2004. *The DHS Wealth Index*. DHS Comparative Reports No. 6. Calverton, Maryland, USA: ORC Macro.

Slaymaker, E. 2004. A critique of international indicators of sexual risk behaviour. *Sexually Transmitted Infections* 80 (suppl. II): ii13-ii21.

Stata Corp. 2003. *Stata 8.1*. College Station, Texas: Stata Corp.

UNAIDS and World Health Organization (WHO). 2006. *UNAIDS/WHO* e*pidemiological fact sheet 2006 update - Cameroon*, UNAIDS and the World Health Organization (WHO) Working Group on HIV/AIDS and STI Surveillance, Geneva, Switzerland.
http://www.who.int/GlobalAtlas/predefinedReports/EFS2006/EFS_PDFs/EFS2006_cm.pdf Date accessed: 11 October, 2006.