HIV STATUS AND AGE AT FIRST MARRIAGE AMONG WOMEN IN CAMEROON

TIMOTHY ADAIR

MEASURE DHS, Macro International Inc., Calverton, MD, USA

Summary. Recent research has highlighted the risk of HIV infection for married teenage women compared with their unmarried counterparts (Clark, 2004). This study assesses whether a relationship exists, for women who have completed their adolescence (age 20–29 years), between HIV status with age at first marriage and the length of time between first sex and first marriage. Multivariate analysis utilizing the nationally representative 2004 Cameroon Demographic and Health Survey shows that late-marrying women and those with a longer period of pre-marital sex have the highest risk of HIV. Although women in urban areas overall marry later than their rural counterparts, the positive relationship between age at marriage and HIV risk is stronger in rural areas. The higher wealth status and greater number of lifetime sexual partners of late-marrying women contribute to their higher HIV risk. Given that the 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 of much importance in reducing HIV prevalence among females.

Introduction

Young women in sub-Saharan African countries have consistently been found to have a higher risk of becoming HIV positive compared with their male counterparts (Glynn *et al.*, 2001; Laga *et al.*, 2001; Gregson *et al.*, 2002). Although findings in various cities have shown that married teenage women are at particularly higher risk of HIV infection, more recently research has provided evidence that women who marry late may have an increased risk because of a longer period between first sex and first marriage (Glynn *et al.*, 2001; Clark, 2004; Bongaarts, 2006). This paper utilizes the 2004 Cameroon Demographic and Health Survey (CDHS) to test whether the risk of HIV infection for women who have completed their adolescence (i.e. age 20–29 years) is positively related to their age at first marriage and 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, but interpretation of these results should consider that HIV-positive married women may have become infected before marriage (Glynn *et al.*, 2001; Lydie *et al.*, 2004; Clark, 2004). Two papers argue that married adolescent women in sub-Saharan Africa may be more vulnerable to HIV infection than unmarried women because they have earlier initiation and greater frequency of sexual intercourse with their husbands, who are more likely to be older and HIV positive than the partners of unmarried women, and use condoms more rarely due to a relative lack of bargaining power in their marriage (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 and, in rural Uganda, especially if they are ten or more years older (Bracher *et al.*, 2003; Kelly *et al.*, 2003). Analysis revealing a negative correlation between median age at first marriage and HIV prevalence in four sub-Saharan African cities also supports the argument of the risks of early marriage (Ferry *et al.*, 2001).

In contrast to these results, Bongaarts (2006) has found from country-level analysis that a higher median age at marriage is positively associated with HIV prevalence. The analysis of 33 sub-Saharan African countries used country-level HIV prevalence data from UNAIDS, primarily sourced from testing of pregnant women in antenatal clinics, and age at marriage data from the DHS. Individual-level analyses of Kenya and Ghana by Bongaarts (2006), using HIV data measured in the DHS and controlling for age, place of 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 provides evidence that late age at marriage increases HIV risk because of a longer period of premarital sex. Other research by Hargreaves *et al.* (2002) within the city of Kisumu, Kenya, found women aged 15–24 years who first marry over the age of 17 years 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 to be non-significant in each of seven different studies.

A trend towards an older age at marriage is evident in Cameroon. Figure 1 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 from first sex to first marriage from 1·1 years to 1·6 years. If there is a positive relationship between HIV risk and age at first marriage, a continuation of this trend in future will emphasize the need to focus prevention efforts on women who marry late.

Cameroon has experienced a sharp increase in HIV prevalence since the early 1990s. According to the median HIV prevalence rate of pregnant women at antenatal clinics, the HIV rate in major urban areas of Cameroon rose from 1·8% in 1992 to 7·0% in 2002 (UNAIDS & WHO, 2006). In the 1980s and early 1990s Cameroon had a low HIV prevalence rate compared with neighbouring countries (Mbopi-Keou *et al.*, 1998). Data from the 2004 CDHS shown in Table 1 reveals that, like other sub-Saharan African countries, younger women in Cameroon have a far higher level of 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
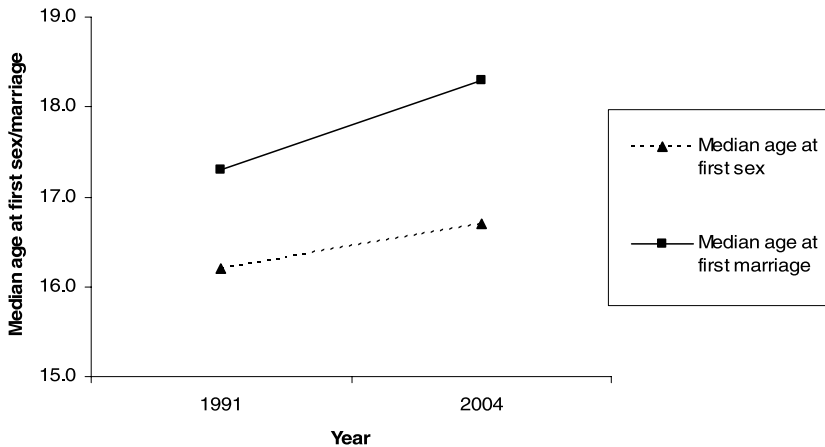
Fig. 1. Median age at first sex, median age at first marriage, women aged 20–24 years, Cameroon, 1991 and 2004 CDHS.

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

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 & ORC Macro (2004).

age group 25–29. Only in the 35–39 age group do men have a higher level of HIV than women.

Examination of the association of HIV and age at first marriage in Cameroon needs to take into account the large regional differences within the country. The northern region is predominantly poor, lower educated and Muslim, 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 regional and socioeconomic differences in age at first marriage exist.

Data and Methods

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%. The HIV testing was undertaken of respondents who voluntarily provided blood samples after being informed of procedures, confidentiality and VCT (voluntary counselling and testing) services. The dried blood spot samples were then tested in a laboratory. Of the 5703 women aged 15–49 years eligible for testing, 7·9% did not provide an HIV sample (5·4% refused to be tested: 8·5% in urban areas, 2·3% in rural areas). The CDHS has the advantage of having detailed socio-demographic information, including the characteristics of married couples, which are anonymously linked to the HIV data. This information enables the relationship between HIV status and age at marriage to be examined quantitatively. Consistent with the CDHS, in this analysis marriage is defined as the age when a woman first began living with a husband or consensual partner.

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; only those who received a conclusive test result (i.e. either HIV positive or HIV negative) and completed an interview are included. To account for women who marry in their twenties, only currently married women aged 20–29 years are analysed. 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 findings of each of these variables controlling just for age; these models are conducted for all Cameroon, separately for urban and rural areas and separately for 20- to 24 and 25- to 29-year-old women, in order to account for variations in the relationship with HIV status by place of residence and age.

Further control variables are included to see if any relationship of age at first marriage or length of pre-marital sexual lives is explained by socioeconomic or regional factors, or if the association remains. The next model includes urban/rural place of residence and education level. The following model includes region of residence, religion and household wealth quintile, a measure of household ownership of durable assets described by Rutstein & Johnson (2004), to examine their effect controlling for urban/rural place of residence and education level. The final model retains urban/rural place of residence and household wealth quintile and adds the behavioural 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 and first marriage is computed from the age at first marriage variables included in other models, the results from the control variables will be very similar.

Table 2. Household wealth quintile, education, religion, place of residence and region of residence by woman's age at first marriage, currently married women aged 20–29 years, Cameroon, 2004 CDHS

	16 years & under	17–19 years	20 years & above	Total	N
Household wealth quintile					
Lowest	66·9	26·1	7·1	100·0	316
Second-lowest	61·3	24·6	14·1	100·0	290
Middle	51·6	30·1	18·3	100·0	275
Second-highest	38·9	34·9	26·2	100·0	295
Highest	21·9	32·0	46·2	100·0	305
Education					
None/primary incomplete	68·8	22·8	8·5	100·0	702
Primary complete	34·6	38·3	27·1	100·0	270
Secondary incomplete +	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
Place of residence					
Urban	38·3	32·0	29·8	100·0	739
Rural	57·8	27·1	15·1	100·0	742
Region of residence					
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	1481

Note: Weighted cases. Only women who received a conclusive HIV test included.
Regions of residence: Central – centre, Douala, Littoral, Yaounde; Southern/eastern – south, east; western – north-west, west; Northern – Adamaoua, extreme north, north.
Source: INS & ORC Macro (2004).

Before the multivariate results are presented, evidence of differences in age at first marriage by socioeconomic status and place of 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, of lesser education, of Muslim faith and residing in rural areas or in the northern region are more likely to

Table 3. Age at marriage by mean age at first sex and number of lifetime number of partners, currently married women aged 20–29, Cameroon, CDHS 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

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

marry early than other women. Of women from the poorest household wealth quintile, 66·9% first married at age 16 or under, compared with only 21·9% from the richest quintile. A similar difference exists between women whose education level is none or incomplete primary (68·8%) and those with incomplete secondary education 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 aged 20–29 years first married at age 16 years and under, compared with 23·7% of women in the central region, which comprises the large urban centres of Yaounde and Douala. Interpretation of these regional differences needs to consider that the northern region is predominantly poor, lower educated and Muslim, compared with the wealthier and predominantly Christian central region. In contrast with the characteristics of early-marrying women, HIV in sub-Saharan Africa is more prevalent among the wealthier, urban population (Garcia-Calleja *et al.*, 2006; Mishra *et al.*, 2007).

Age at first marriage also varies by sexual behaviour, as shown in Table 3. Mean age at first sex increases quite strongly with age at marriage; mean age at first sex is 14·6 years for women marrying at 16 years, compared with age 16·8 years for those marrying at 17–19 years and age 17·3 years for those marrying at 20 years and above. Women who marry earlier experience sexual intercourse at a younger age, but have a substantially lower reported number of lifetime sexual partners than those marrying later. Slightly more than half of women who married at age 16 years and under report only one lifetime partner, while 69·1% of those married at 20 years and above report three or more partners. Women marrying in their twenties thus have, on average, longer pre-marital sexual lives and a greater number of partners than women marrying earlier.

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, possibly because many had husbands who died from AIDS.

Table 4. HIV status by marital status and age group, women age 15–29 years who
have ever had sex, Cameroon, CDHS 2004

Age group	Marital status	HIV positive (%)	N	χ^2 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.
*χ^2 test conducted of never-married women versus currently married women.
Source: INS & 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 aged 20–29
years. Age at first marriage has a strong positive relationship with HIV status; the
prevalence for a woman married at age 16 years or younger (5·7%), which includes
approximately half of the women in the analysis, is less than half that of those
married at age 20 years or higher (13·4%). Women living in rural areas are also far
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 (16 years and under:
4·0%, 17–19 years: 4·4%) and at 20 years and older (13·1%). The mean age at first sex
does not differ significantly by whether a woman is infected in any of the groups of
analysis. 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, education level and especially
household wealth quintile are associated with HIV status. There is a noticeably low
level of HIV prevalence for the least educated (5·0%) and poorest women (3·2%).
There is also a significantly lower HIV prevalence for women in the northern region
(4·6%) compared with other regions, and for Muslims (6·4%) and women of other
religions (4·1%) compared with women of other religions. Women who are HIV
positive 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 aged 20–29 years, Cameroon, CDHS 2004

	%	HIV+ (%)
Outcome variable		
HIV status		
HIV positive	8·2	—
HIV negative	91·8	
Explanatory variables		
Age at first marriage – all		**
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 – urban		
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 marr. – all		**
Mean	1·3	HIV+ = 2·1
Missing (*n*)	8	HIV − = 1·2
Years between first sex and first marr. – urban		
Mean	1·6	HIV+ = 2·1
Missing (*n*)	6	HIV − = 1·6
Years between first sex and first marr. – rural		**
Mean	0·9	HIV+ = 2·1
Missing (*n*)	2	HIV − = 0·8

Table 5. *Continued*

	%	HIV+ (%)
Years between first sex and first marr. – 20–24		*
Mean	0·9	HIV+=1·8
Missing (*n*)	2	HIV − =0·8
Years between first sex and first marr. – 25–29		*
Mean	1·7	HIV+=2·4
Missing (*n*)	6	HIV − =1·6
Current age		**
Mean	24·3	HIV+=25·0
		HIV − =24·2
Place of residence		**
Urban	49·9	11·0
Rural	50·1	5·5
Education level		**
None/primary incomplete	47·7	5·0
Primary complete	18·2	9·8
Secondary incomplete +	34·4	11·8
Region of residence		**
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	
Yes	10·3	
Missing (*n*)	153	
Total cases	1481	

Note: *p* value is obtained from a χ^2 test or, for age and number of lifetime partners, a *t* test. Weighted cases. χ^2 tests are conducted for categorical variables and *t* tests for continuous variables. For variables with three or more categories, χ^2 tests are undertaken to test significance across all categories.
*$p<0.05$; **$p<0.01$.
Source: INS & ORC Macro (2004).

The multivariate analysis of age at first marriage for all women aged 20–29 years in Table 6 shows that, controlling for age at first sex and current age, those women marrying at age 20 years and above in Cameroon are over two-and-a-half times more likely to be HIV positive than those marrying at age 16 years and under. This corresponds to the finding of Bongaarts (2006) from country-level analysis of sub-Saharan Africa. There is no significant difference between women who married at age 17–19 years and age 16 years and under. Age at first sex is not significantly associated with HIV status for all women aged 20–29 years, which corresponds to the review by Slaymaker (2004). For the analysis within urban areas, both age at first marriage and age at first sex have no significant relationship with HIV status. In contrast, in rural areas there is a very strong and significant association; women marrying at age 20 years and over are more than three times as likely to be HIV positive as those marrying at 16 years and under. There is some difference in the effect of age at marriage by age cohort. For women aged 20–24 years, marrying at age 20 years and above more strongly predicts HIV status than for women age 25–29 years (20–24 odds ratio=3·49, 25–29 odds ratio=2·25). Furthermore, for women aged 20–24 years, the risk of HIV is 20% lower for each year that age at first sex is later. There is no such relationship for women aged 25–29 years.

Table 7 shows that for women aged 20–29 years 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 a woman's age at first sex and first marriage, her risk of HIV increases by 10%. This corresponds with the finding in Table 6, where first marriage at age 20 years or above is positively related with HIV infection but age at first sex is not. The number of years between first sex and first marriage is also positively related with being HIV positive in rural Cameroon (15% increase in risk of infection for each additional year) and for 20- to 24-year-old women (18% increase in risk of infection for each additional year). There is no relationship with HIV status in urban Cameroon, where age at marriage has no association with being HIV positive, and for 25- to 29-year-old women.

Table 8 shows that age at first marriage loses part of its predictive power after including the control variables in Models 1 and 2, but it remains significant. In Model 1, living in a rural compared with 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 very strong predictor of HIV status and also reduces the strength of age at first marriage. A woman living in a household in the middle, richer and richest quintile is far more likely (middle odds ratio=2·85, richer odds ratio=3·64, richest odds ratio=3·55) than a woman in the poorest wealth quintile of being HIV positive. Region of residence and religion have no association with HIV status after controlling for other factors. In Model 3, the number of lifetime partners is significantly related to HIV status. For each additional partner a woman has ever 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, which is expected given its strong relationship with number of lifetime partners shown in Table 3.

Table 6. Multivariate analysis of HIV status, currently married women aged 20–29 years, Cameroon, 2004 CDHS

| | | | Place of 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
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	1476		630		846		762		714	

*p<0·05; **p<0·01.
Source: INS & ORC Macro (2004).

Table 7. Multivariate analysis of HIV status, currently married women aged 20–29 years, Cameroon, 2004 CDHS

| Variable | All | | Place of residence | | | | Age | | | |
| | | | Urban | | Rural | | 20–24 years | | 25–29 years | |
	Odds ratio	Z	Odds ratio	Z	Odds ratio	Z	Odds ratio	Z	Odds ratio	Z
Years between first sex & 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	1476		630		846		762		714	

*p<0·05; **p<0·01.
Source: INS & ORC Macro (2004).

Table 8. Multivariate analysis of HIV status, currently married women aged 20–29 years, Cameroon, 2004 CDHS

Variable	Model 1		Model 2		Model 3	
	Odds ratio	Z	Odds ratio	Z	Odds ratio	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
Place of residence						
Urban	Ref.				Ref.	
Rural	0·61*	− 2·11			0·94	− 0·21
Education level						
None/primary incomplete	Ref.		—		—	
Primary complete	1·61	1·56				
Secondary incomplete +	1·69	1·79				
Region of residence						
Central (Ref.)	—		Ref.		—	
Southern/eastern			1·39	1·09		
Western			1·53	1·48		
Northern			1·24	0·56		
Household wealth quintile						
Lowest	—		Ref.		Ref.	
Second-lowest			1·03	− 0·23	0·89	− 0·23
Middle			2·85**	2·61	2·69**	2·61
Second-highest			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					0·78	− 0·70
Number of cases	1476		1474		1317	

*$p<0.05$; **$p<0.01$.
Source: INS & 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 20- to 29-year-old women in Cameroon. As expected, the results of the control variables are very similar to those in Table 8. The only clear difference is that

Table 9. Multivariate analysis of HIV status, currently married women aged 20–29 years, Cameroon, 2004 CDHS

Variable	Model 1		Model 2		Model 3	
	Odds ratio	Z	Odds ratio	Z	Odds ratio	Z
Years between first sex &						
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
Place of residence						
Urban	Ref.		—		Ref.	
Rural	0·60*	−2·11			0·95	−0·19
Education level						
None/primary incomplete	Ref.		—		—	
Primary complete	1·66	1·68				
Secondary incomplete +	1·75*	1·98				
Region of residence						
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-lowest			1·04	0·09	0·91	−0·19
Middle			2·88**	2·60	2·76**	2·65
Second-highest			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	1476		1474		1317	

*$p<0.05$; **$p<0.01$.
Source: INS & ORC Macro (2004).

women whose education level is incomplete secondary or higher are significantly more likely to be HIV positive (odds ratio=1·75) than a woman who didn't complete primary school.

Discussion and Conclusion

Marriage at age 20 years and above predicts a higher likelihood of being HIV positive for currently married women aged 20–29 years in Cameroon compared with those

marrying at age 16 years and under, controlling for age at first sex and current age. Marriage at age 17–19 years, however, does not significantly increase HIV risk. Bongaarts (2006) also found a positive relationship between age at marriage and HIV risk from country-level analysis in 33 sub-Saharan countries. It is important to distinguish these findings from those of Clark (2004), 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 non-significant HIV prevalence than never-married women. However, HIV-positive married women may have become infected before marriage. Furthermore, analysis of women aged 20–29 years, who have completed their adolescence, provides a more complete perspective of the risk of HIV for women marrying later.

The higher risk of HIV of late-marrying women is largely explained by their longer pre-marital sexual period. The positive relationship of the number of years between age at first sex and 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 for women aged 20–29 years that shows age at first sex has no significant association with HIV status, which was revealed by Slaymaker (2004). These findings support the hypothesis that late marriage and a longer period of pre-martial sex 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 sex 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 a relatively high HIV risk in rural areas. Table 5 shows that the HIV prevalence of women in rural areas marrying at age 20 years and above is similar to 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 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 pre-marital sex are at high risk irrespective of where they live. This group in rural areas may include women who are circular migrants 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 pre-marital sex with HIV risk is stronger for 20- to 24-year-old women than 25- to 29-year-old women, but this difference is not large enough to make clear conclusions. However, there is an obvious variation in the result for age at first sex by age cohort. For women aged 20–24 years, those who make their sexual debut later have a lower HIV risk, while for 25- to 29-year-olds and all women aged 25–29 years 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 20- to 24-year-olds in 2004 would have begun their sexual lives. 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 25- to 29-year-olds would have had sex 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 25- to 29-year-olds. 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 place of residence and 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 pre-marital 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 of residence, 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 pre-marital sex.

Socioeconomic status and place of residence does not explain all of the relationship of age at marriage and HIV status, but 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 shown in Table 3. This result demonstrates that the higher HIV risk of later-marrying women, and those who have a longer period of pre-marital sex, is somewhat explained by their greater number of partners. Those women who have married early instead overall have a shorter length of period of pre-marital sex, a much lower lifetime number of partners and smaller 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 relations with a large number of men.

The major implication of these findings for policy is that it emphasizes the importance of the period of pre-marital 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 pre-marital sexual activity should address their number of partners. Furthermore, policy should be tailored to the place of residence; although overall HIV risk is lower and late marriage is less common in rural 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 the age at marriage and the length of time between first sex and marriage in Cameroon is a pertinent trend given the findings of this paper. Should this rise continue, there will be an even greater need in future to protect women during the pre-marital sexual period from contracting HIV. Effective policy interventions in such a circumstance would require increased resource commitments.

Acknowledgments

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