J.biosoc.Sci, (2007) **39**, 397–408, © 2006 Cambridge University Press
doi:10.1017/S0021932006001489 First published online 23 Aug 2006

EPIDEMIOLOGICAL FEATURES OF HIV INFECTION AMONG PREGNANT WOMEN IN MAKURDI, BENUE STATE, NIGERIA

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Summary. Women in Benue State have for years had the highest HIV rate in the country, but because the sentinel surveys are anonymized and unlinked, not much is known about the socio-demographic, behavioural and other risk factors that predispose these women to the disease. The HIV/AIDS epidemic in Nigeria does not appear to be a single epidemic but rather multiple epidemics of varying magnitude and trends. This cross-sectional study was therefore carried out to identify the risk factors for HIV/AIDS among these women. A total of 404 consecutive consenting mothers enrolled at the booking clinic were followed up until delivery of their babies. They were interviewed using a semi-structured questionnaire and tested for HIV infection using an ELISA-based kit after obtaining informed consent. Mean age of the mothers was 26 ± 6·1 years, 94·8% were married while 50·5% had at least secondary level education. Sixty-one (15·1%) mothers were HIV positive with mothers aged 15–24 years being responsible for 50·8% of all infection. Following bivariate analysis, being single, having a partner with low level of formal education, living in a rural location, being in a polygamous/multiple partner union, being a higher order polygamous wife, being married more than once and reporting a history of a sexually transmitted infection were significantly associated with HIV infection. Monogamous women who lived apart from their partners and women who had ever had blood transfusion were also more likely to be HIV positive. Following multivariate logistic regression, a young age of 15–24 years (multivariate OR=3·3, 95% CI=1·2–8·4, p=0·02); ever had other STIs (OR=1·6, 95% CI 1·1–2·3, p=0·009); no formal maternal education (OR=0·6, 95% CI 0·4–0·9, p=0·021) and having one lifetime sexual partner (OR=0·4, 95% CI 0·3–0·5, p<0·00001) were significantly associated with HIV infection in the study population. Appropriate interventions must be directed at young people and should include STI control and abstinence education. Blood safety must be ensured as well as a general improvement in the level of formal and health education in this community.

Introduction

In Nigeria, the first AIDS cases were reported in 1986. The federal government responded by setting up a National Expert Advisory Committee on AIDS (NAECA) in 1986. In 2000, a presidential committee on AIDS and a National Action Committee on AIDS (NACA) were established along with the adoption of a three-year Interim Action Plan (FMOH, 2000; UNICEF, 2001). The HIV/AIDS epidemic in Nigeria does not appear to be a single epidemic but multiple epidemics of varying magnitude and trends at zonal and state level (UNAIDS/WHO/UNICEF, 2004).

The HIV/AIDS epidemic is promoted by having multiple sex partners (for both men and women), social norms that condone, even encourage, multiple sexual partners in men of all ages, and social taboos that prevent teaching or discussing sex with young people, poverty and women's emotional and socioeconomic dependence on men, particularly those with low levels of education (Madunga, 1998; Larkin, 1998; Wall, 1998; Ali & Cleland, 2001; Lawoyin & Larsen, 2002; UNAIDS, 2004; Mitsunaga *et al.*, 2005).

The national sentinel surveillance data for 2001 showed that the trend of HIV infection in the North–Central zone was 6·7%. The figure for pregnant women in Makurdi was 14·4% in 2001 and much higher than the zonal rate (UNAIDS/UNICEF/WHO, 2004). The surveillance system in use is rigid and in some places has failed to keep up with the needs and development of control measures of the HIV epidemic because it is anonymized and unlinked, yielding little information on the epidemiology of HIV in women (Lawoyin & Adewole, 2004). This is necessary for tracking the patterns of HIV spread and adapting responses accordingly. Recognition of the factors that fuel the HIV epidemic would promote the development of programmes for reducing vulnerability that would work within the more traditional prevention framework for reducing risk-taking behaviour, yet only a few studies have been carried out to identify the behavioural characteristics of antenatal women that put them at risk. There are also too few data linking behaviour with HIV sero-status. This study was therefore carried out to identify socio-demographic, behavioural and others factors that place women at risk for HIV/AIDS in a community with a persistently high HIV sero-prevalence rate and to link these factors with their HIV sero-status.

Methods

This cross-sectional study examined risk factors for HIV infection among women attending antenatal clinics at the secondary level health care facility in Makurdi between December 2002 and April 2003. The research was exploratory and analytical in design. The population for this study comprised of all consenting pregnant women that attended the antenatal clinics at the secondary health care facility. A pre-tested, pre-coded, semi-structured questionnaire with open- and closed-ended questions was used. The questionnaire was pre-tested in a facility that was not part of the study. Venous blood was collected for HIV test from the consenting pregnant women. Serum was tested for HIV using the recombinant ELISA-based kit (Human Biochemical and

Diagnostic laboratories, Germany). Those who screened positive were re-tested using Capillus HIV 1 & 2 (Cambridge Diagnostics). Positive mothers were counselled and referred for appropriate care. Those who tested positive were cases while those who tested negative were unmatched controls.

The variables of interest included demographic, socioeconomic status, reproductive history, behavioural and cultural factors. The questionnaires were serialized and the data obtained from them were entered into the computer using EPI Info 6·04 version for univariate and bivariate analysis. Data were exported to SYSTAT for multiple logistic regression analysis. Cases were compared with the control in relation to the risk exposure under investigation. The odds ratios were generated to establish the exposure as a risk factor for the disease. All associations significant at the 5% level were significant. For multivariate logistic regression analysis, these factors were analysed simultaneously to remove the effect of confounders. Variables that had at least borderline significance or are known to be associated with HIV were entered into the regression model. Due to small numbers in cells, some of the groups in the variable were collapsed to form a larger group for the purpose of analysis. An odds ratio of greater than one for a particular variable indicates that the study subjects in that category were more likely to be HIV positive than were respondents in the reference category. Subjects having odds ratios of less than one were less likely to be HIV positive than were subjects in the reference category. An odds ratio of one or close to one indicates no difference in the likelihood of being HIV positive in comparison with the reference population. A p value of $\leq 0{\cdot}05$ was accepted as statistically significant for the model. Ethical approval was obtained from the joint University Institutional Review Committee and the management of the facility used.

Results

Of the 404 women who completed questionnaires, 61 (15·1%) tested positive for HIV. The mean age of the mothers was $26 \pm 6{\cdot}1$ years; 94·8% were married while 50·5% had at least secondary level education. Table 1 shows the relationship between socio-demographic factors and HIV infection. The mothers aged 20–24 years followed by those aged 25–29 years had the highest risk of infection. Young pregnant mothers aged 15–24 years were responsible for 50·8% of all infection. Out of 383 who were married only 13·8% tested positive compared with the single mothers of whom 37·5% tested positive. Thus being a single mother was a risk factor for infection (OR = 3·7, 95% CI 1·06–11·8, Fisher's Exact $p = 0{\cdot}0196$). All the mothers who were separated from their spouses tested positive and the risk of HIV infection was higher among the women who were not currently married. The women in these categories were, however, too few for any more meaningful analysis.

The risk of HIV infection was not linear and was higher among respondents with primary and secondary education and lower among those who either had no formal education or who had tertiary education. The 'no formal education status' of the husband was, however, associated with significantly increased risk of infection in respondents. The more educated the partners of these women were, the less likely the women were to be infected.

https://doi.org/10.1017/S0021932006001489 Published online by Cambridge University Press

Table 1. Socio-demographic factors and HIV infection

Characteristic	*n* (%) (*N*=404)	HIV positive *n* (%)	OR ratio	(95% CI)
Age in years				
15–19	54 (13·4)	6 (11·1)	1·00	
20–24	125 (30·9)	25 (20·0)	2·00	(0·72–5·85)
25–29	110 (27·2)	17 (15·5)	1·46	(0·5–4·47)
30+	115 (28·5)	13 (11·3)	1·02	(0·33–3·23)
Marital status				
Married	383 (94·8)	53 (13·8)	1·00	
Single	16 (4·0)	6 (37·5)	3·70	(1·06–11·85)
Widowed	3 (0·7)	0 (0·0)	na	
Separated	2 (0·5)	2 (100)	na	
Type of marriage				
Monogamy	300 (74·3)	34 (11·3)	1·00	
Polygamy/multiple partners	104 (25·7)	27 (26·0)	2·74	(1·49–5·04)
Respondent's educational status				
None	76 (18·8)	8 (10·5)	1·33	(0·29–8·32)
Primary	124 (30·7)	22 (17·7)	2·23	(0·60–12·35)
Secondary	170 (42·1)	28 (16·5)	2·04	(0·57–11·10)
Tertiary	34 (8·4)	3 (8·3)	1·00	
Husband/partner's education				
None	23 (5·7)	8 (34·8)	4·37	(1·35–13·22)
Primary	71 (17·6)	11 (15·5)	1·50	(0·58–3·74)
Secondary	172 (42·6)	27 (15·7)	1·53	(0·74–3·23)
Tertiary	138 (34·2)	15 (10·9)	1·00	
Respondent's occupation				
Unskilled	249 (61·6)	44 (17·7)	1·75	(0·89–3·60)
Semi-skilled	128 (31·7)	14 (10·9)	1·00	
Skilled/professional	27 (6·7)	3 (11·1)	1·07	(0·17–4·07)
Husband/partner's occupation				
Unskilled	177 (43·8)	35 (19·8)	1·79	(1·00–3·25)
Semi-skilled	215 (53·2)	26 (12·0)	1·00	
Skilled/professional	12 (3·0)	0 (0·0)	na	
Location of respondent				
Urban	365 (90·3)	50 (13·7)	1·00	
Rural	39 (9·7)	11 (28·2)	2·74	(1·08–5·59)
Religion of respondent				
Christianity	371 (91·8)	56 (15·1)	1·00	
Islam	28 (6·9)	2 (17·9)	1·22	(0·35–3·48)
Other	5 (1·2)	0 (0·0)		

The occupationally unskilled mother had a higher HIV rate compared with the partially skilled and skilled/professionals, though the difference was only of borderline significance. The wives of unskilled men were also at a significantly increased risk for

https://doi.org/10.1017/S0021932006001489 Published online by Cambridge University Press

Table 2. Socio-behavioural and reproductive risk factors for HIV infection

Characteristic	HIV positive *n* (%)	Odds ratio	95% CI
Age at first intercourse (years)			
10–17	34 (21·7)	2·25	(1·25–4·05)
>17	27 (10·9)	1·00	
No. sexual partners in last year			
One	49 (13·3)	1·00	
>One	12 (34·3)	3·41	(1·49–7·73)
No. lifetime sexual partners			
One	9 (3·8)	1·00	
>One	52 (31·3)	11·61	(5·29–26·3)
Living together			
Yes	45 (12·4)	0·22	(0·1–0·47)
No	16 (39·0)	1·00	
Not living together and type of marriage			
Monogamous	10 (24·4)	8·82	(3·14–24·8)
Polygamous	6 (14·6)	1·00	
Age at first marriage (years)			
10–17	13 (11·8)	0·69	(0·34–1·39)
>17	48 (16·3)	1·00	
Number of times married			
Once	54 (13·9)	1·00	
>Once	7 (43·8)	4·81	(1·51–14·86)
History of STI			
Yes	36 (20·2)	2·04	(1·13–3·86)
No	25 (11·1)	1·00	
History of previously induced abortion			
Yes	3 (23·0)	1·71	(0·29–6·91)
No	58 (14·8)	1·00	
Ever-use of contraceptives			
Yes	16 (12·3)	0·71	(0·37–1·37).
No	45 (16·4)	1·00	
Ever-use of condoms			
Yes	15 (14·6)	0·91	(0·48–1·85)
No	46 (15·2)	1·00	
History of blood transfusion			
Yes	8 (40·0)	4·16	(1·40–11·63)
No	53 (15·3)	1·00	
Female genital mutilation			
Yes	10 (16·1)	1·10	(0·47–2·37)
No	51 (14·9)	1·00	

HIV infection compared with the wives of partially skilled husbands (OR = 1·79, 95% CI = 1·00–3·25, $p = 0·03$) and significantly more rural dwellers were HIV positive (OR = 2·74, 95% CI = 1·08–5·59, $p = 0·0161$).

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Table 2 shows the relationship between selected behavioural and reproductive health factors and HIV infection. Mothers who had their sexual debut early (10–17 years) had a higher rate of infection (OR=2·25, 95% CI=1·25–4·07, p=0·0·003). The risk of HIV infection was significantly increased with a higher number of sexual partners in the last year prior to the study (OR=3·41, 95% CI=1·49–7·73, Fisher's Exact p=0·0021). The risk of HIV infection was higher among women with more than one lifetime sexual partner (OR=11·61, 95% CI=5·29–26·3, Fisher's Exact p<0·000001).

Overall, not living together regardless of type of marriage significantly increased the risk of HIV infection (OR=4·52, 95% CI=2·12–9·62, p=0·000006). When stratified by type of marriage, women in monogamous marriages not living with their partners were significantly at risk for HIV infection when compared with their counterparts who were living together (OR=8·82, 95% CI=3·14–24·83, Fisher's Exact p=0·000023). When polygamous women only were considered, not living together increased their risk of infection compared with their counterparts living together, though the difference was not statistically significant (OR=1·41, 95% CI=0·41–4·71, Fisher's Exact p=0·36). Higher order wives were more likely to be infected compared with first wives or only wives (χ^2=11·50, 1 df, p=0·00069). Most women marry before the age of 20 years in this community. The risk of HIV infection was lower in women who married early than in those who married later, though this was not significant. Being in more than one marriage also increased their risk (OR=4·81, 95% CI=1·51–14·86, Fisher's Exact p=0·0048). A self-reported history of sexually transmitted infection (STI) (OR=2·04, 95% CI=1·13–3·86, Fisher's Exact p=0·0106) and of blood transfusion (OR=4·16, 95% CI=1·40–11·63, p=0·0049) were significant risk factors for HIV infection.

The risk of HIV infection was also higher in respondents with a history of induced abortion and was lower in women who reported having ever used contraceptives, though the differences were not significant. Ever-use of condoms was not a risk factor in this population, and neither was female genital mutilation, which is not widely practised in the study population.

Table 3 presents the results of the multivariate logistic regression for HIV/AIDS in Makurdi. The identified risk factors were assessed simultaneously. The dependent variable was HIV infection as a dichotomous variable (HIV infection positive or negative) while the independent variables were the identified risk factors, which were fed into the model. The younger the women, the more likely they were to be infected, with youths ($\leq$24 years) having the highest risk (multivariate OR=3·3, 95% CI=1·2–8·4, p=0·02). History of sexually transmitted infection was associated with a significantly increased risk (OR=1·6, 95% CI=1·1–2·3, p=0·009). The fewer the lifetime partners, the lower the risk and a dose–response was observed. Low maternal education (nil and primary) as a risk factor was protective. Being married (as opposed to being single, divorced or separated), having only one sexual partner in the last 12 months prior to the study, couples living together and monogamy were also protective though none of these associations reached statistical significance level. Ever having received a blood transfusion and age at first marriage were not significant in the model (not shown).

Table 3. Adjusted[a] odds ratio of a pregnant woman having HIV infection in Makurdi, Benue State

Variable	Odds ratio	95% CI	*p* value
Age in years			
15–24	3·3	1·2–8·4	0·020
25–29	1·4	0·9–2·3	0·087
30+	1·0		
Respondent's educational status			
None	0·6	0·4–0·9	0·021
Primary	0·5	0·3–0·97	0·039
Secondary & higher	1·0		
Marital status			
Married	0·85	0·4–2·0	0·710
Not married[b]	1·0		
Respondent's occupation			
Lower[c]	1·2	0·8 – 1·9	0·369
Higher[d]	1·0		
Husband/partner's occupation			
Lower[c]	1·3	0·9–1·9	0·184
Higher[d]	1·0		
Husband/partner's education			
None	1·01	0·7–1·5	0·945
Primary	0·8	0·5–1·4	0·594
Secondary & higher	1·0		
Position of respondent among wives			
First/only wife	0·8	0·15–4·5	0·815
Not first	1·0		
Location of respondent			
Rural	1·9	0·6–5·8	0·236
Urban	1·0		
No. sexual partners in last year			
One	0·72	0·4–1·2	0·542
>One	1·0		
History of STI			
Yes	1·6	1·1–2·3	0·009
No	1·0		
Number of times married			
Once	0·3	0·07–1·2	0·09
>Once	1·0		
Type of marriage			
Monogamy	0·52	0·1–2·4	0·399
Polygamy	1·0		
No. lifetime sexual partners			
One	0·4	0·3–0·5	<0·0001
2–20	0·5	0·32–0·8	0·008
>20	1·0		

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Table 3. *continued*

Variable	Odds ratio	95% CI	*p* value
Age at first intercourse (years)			
10–17	0·6	0·3–1·4	0·244
>17	1·0	1·0	
Living together			
Yes	0·7	0·2–2·0	0·437
No	1·0		

[a]Quasi maximum likelihood adjusted; [b]single, divorced or widowed; [c]unskilled; [d]skilled or professional.

Discussion

This study was carried out to determine the prevalence of HIV and identify risk factors associated with HIV infection among antenatal women attending a secondary health care facility in Makurdi, Benue State, north-central Nigeria, where anonymized sentinel surveys have always recorded one of the highest rates of HIV in the country. The prevalence of HIV infection among the study women was 15·1%. This was slightly higher than the state sentinel rates in 2001 of 14·4% (FMOH, 2001; UNAIDS/WHO/UNICEF, 2004). According to data from the National Health Management Information system (NHMIS), AIDS was reported as the second most common cause of death among Nigerian women (UNICEF, 2001) and underlines the threat that HIV/AIDS poses to women and their children in Nigeria and in this community in particular.

Prevalence of HIV was highest among young mothers ($\leq$29 years) in the bivariate analysis, and after adjustment the youngest mothers still had the highest rates. This finding is consistent with the rates obtained by the National HIV/AIDS/STI Control Programs (NASCP) of the Federal Ministry of Health whose statistics indicate that HIV is most widespread among the youngest women in Nigeria. It also follows the global trend, which shows that about half of new infections are in women aged 15–24 years. With 60% of the population under 24, unmarried adolescent girls and young women are particularly at risk in the study population. This may be due to casual dating and economically driven involvement in sex or 'sex for favours', which are known to occur in this area (Odebiyi & Orubuloye, 1993). Young women worldwide are vulnerable to HIV infection because they are beginning sexual activity at an increasingly younger age, and tend to have multiple partners and have restricted access to information on safer sexual practices. In addition, the interplay of a wide range of factors in the study area such as inter-tribal and community clashes has led to economic hardship, which exposes young women to risky sexual behaviours. Fertility is generally high in women under 29 years and this study found HIV infection rates also to be high. The implication is that the study area will see more infected babies through the vertical transmission of HIV if adequate preventive measures are not put in place to address this problem. The window of opportunity

https://doi.org/10.1017/S0021932006001489 Published online by Cambridge University Press

for prevention that exists before an adolescent's sexual debut should be maximized and programmes for preventing HIV/AIDS should also be implemented urgently in this area among the youth.

Although unmarried women (single, divorced and separated mothers) had the highest rate of HIV infection, HIV prevalence was also high (5% and more) among the married women in this community. This suggests that marriage is protective only when no risky sexual behaviour is exhibited by either partner in matrimony, especially by men, and underlines the need to involve men in the control of HIV infection in this community. Polygamy is widely practised in Nigeria although its incidence appears to be declining. It is however evolving into a looser and perhaps more covert form in urban areas where modern polygamy often takes a non-residential form (NPC, 2003). Couples who lived apart were found to have an increased risk of infection in this study, as did higher order wives. While this study did not examine male-specific risks, it is generally known that male partners in different parts of Nigeria contribute to infections in their partners (Caldwell *et al*., 1997; Lawoyin & Larsen, 2002).

In the bivariate analysis, location was a significant predictor of HIV infection with women in rural areas having the higher risk. The 2001 unadjusted sentinel survey revealed that there was a clear urban preponderance only in thirteen of the 36 states (FMOH, 2001). The reasons for rural–urban differences remain unclear. However, ignorance, poverty and urban–rural migration during festivities, more acceptable practice of polygamy and gender inequities may have roles to play in contributing to the higher prevalence in rural areas. Moreover, a lack of information, lower levels of education and communication materials, reduced acceptability, affordability and availability of condoms, and low HIV education may be fuelling the spread of HIV infection in rural areas. Further studies are however needed to link these factors and establish association with HIV infection in rural area.

Makurdi, the study area, houses the military, an airforce base and also serves as a major truck route (UNAIDS/WHO/UNAIDS, 2004). Some of the area's uniformed men were in Liberia and Sierra Leone as peacekeepers. It was observed that a substantial number of wives of drivers and peacekeepers in this study were HIV positive (data not shown). Mobility is a strong determinant of casual sex and risk for HIV in Nigeria and Africa as a whole (Shabbir & Larson, 1995; Lydie & Robinson, 1998; UNAIDS-APICT, 1998; Kishamawe *et al*., 2006).

Education equips one with knowledge but the correlation between knowledge and behaviour may not be linear, as found in this study. Kapiga *et al.* (1994) found an inverse relationship between formal education and behaviour in Tanzania. In another study in South Africa (Booysen & Bachmann, 2002) the risk of HIV infection increased with high educational attainment. Lawoyin & Larsen (2002), in their study in the south-west of Nigeria, observed that higher education was protective, and suggested that better educated men were likely to be better informed about the HIV epidemic and its dangers. Kapiga *et al*. (1994) in their study argue that the excess infection levels observed among the more educated groups disappear as the epidemic progresses because educated people adopt less risky lifestyles quicker than other groups do. Qualitative research would enhance the study and explain better these relationships.

Age at first intercourse has a strong association with the number of sexual partners a person has over a lifetime (Kost & Forrest, 1992). Amadi & Odutola (2000) found the average age of first intercourse to be 15·5 years in Nigeria. There is an agreement between their findings and the finding of this study that about 88% of respondents had experienced sexual intercourse by the time they were 19 years old. However, in this community, this is likely to have occurred within marriage since most marry early and certainly before the age of 20 years.

Sexually transmitted infections and HIV share the same route of transmission and STIs further enhance the transmission of HIV. Rate of HIV infection has increased among STI patients in Nigeria, rising from 4·6% in 1992 to 15·1% in 1996 (FMOH, 2001). Several epidemiological and biological studies support the hypothesis that STIs enhance HIV transmission (Islam & Piot, 1992; Dallabetta & Neilson, 2003; Kehinde & Lawoyin, 2005). Sexually transmitted infection control programmes need to be put in place and made especially suitable for the young people in the study population.

A history of induced abortion is associated with an increased risk of HIV. Abortion is illegal in Nigeria and can only be done to save the life of the mother. Despite this, there is evidence to show that it occurs (Raufu, 2002). The possibility of using non-sterilized equipment is high as the procedures are usually carried out by quacks or those who do not possess the required skills. Further studies are necessary to determine the contribution of abortion to the spread of HIV infection.

Until recently screening of blood for HIV before transfusion was not a regular practice in Nigeria. This study suggests that blood transfusion may be contributing to the high HIV rate in the study population though results were attenuated after adjustment. More studies are however needed to determine the role and extent to which blood transfusion contributes to the spread of HIV/AIDS in this community. Greater emphasis should be placed on blood safety, which is critically important in saving women's lives, because complications of pregnancy, childbirth and abortion are still the most common reasons why women need transfusions.

This study identified the risk factors for HIV infection among women at the secondary level of care in Makurdi and has provided some epidemiological data on antenatal women normally screened during the sentinel surveys in north-central Nigeria.

One major limitation is that the study is facility-based and may not be representative of the general population. Based on the identified risk factors, appropriate interventions must be directed at young people and should include STI control, sexual abstinence education, ensuring blood safety, putting in place interventions to prevent mother-to-child transmission of HIV and a general improvement in the level of formal and health education in the population.

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