

AIDS-related knowledge and sexual behaviour among married and previously married persons in rural central Mozambique

Bruce H Noden, Aurelio Gomes, Aldina Ferreira

Abstract

HIV prevalence in central Mozambique is the highest in the country with high urban rates impacting on the rural areas. To identify potential factors influencing the spread of HIV in three sparsely populated districts in southern Sofala province, 847 married and previously married persons were surveyed for their knowledge, practices and beliefs regarding HIV/AIDS and STIs. 21.9% and 6.5% of males and females, respectively, were engaged in casual sexual partnerships in the past year. Being male, married, educated, and having genital discharge and ulcers in the last year were significantly associated with risky sexual activity. Risky behaviour was significantly associated with being Catholic or Protestant when compared with those from Zionist churches. Knowledge of ABC prevention strategies and condom usage was significantly associated with being male, married, having an STI in the past year, and being educated, particularly at the secondary level (Grade 8+). Attitudes and behaviour were influenced by cultural and religious involvement, as well as sex and marital status. It is imperative that prevention strategies take into account the cultural, economic and religious conditions present in rural African settings to create HIV prevention programmes that are culturally relevant and acceptable to the participants.

Keywords: HIV, prevention, Mozambique, sexual behaviour, rural, married persons.

Résumé

La prévalence du VIH dans le centre du Mozambique est la plus élevée du pays, avec des taux urbains élevés affectant les zones rurales. Pour identifier les facteurs potentiels influençant la diffusion du VIH dans trois districts faiblement peuplés de la province sud de Sofala, 847 personnes mariées et précédemment mariées ont été sondées afin d'évaluer les connaissances, leurs pratiques et leurs croyances sur le VIH/SIDA et les MST. 21.9% des hommes et 6.5% des femmes avaient pris part à des rapports sexuels occasionnels au cours de l'année précédente. Le fait d'être un homme, marié, éduqué, et d'avoir souffert de sécrétions génitales et d'ulcères au cours de l'année précédente était significativement associé à une activité sexuelle à risque. Les comportements à risque étaient significativement associés au fait d'être catholique ou protestant par comparaison aux personnes appartenant aux églises zionistes. La connaissance des stratégies de prévention basées sur l'abstinence, la fidélité et le recours au préservatif était significativement associée au fait d'être un homme, marié, ayant souffert d'une MST au cours de l'année précédente, et d'être éduqué, en particulier au niveau secondaire (à partir de la seconde). Les attitudes et les comportements étaient influencés par les affiliations culturelles et religieuses ainsi que par le statut sexuel et conjugal. Il est impératif que les stratégies de prévention prennent en compte les conditions culturelles, économiques et religieuses qui existent en Afrique rurale afin de créer des programmes de prévention du VIH pertinents et acceptables d'un point de vue culturel pour les participants.

Mots clés: VIH, prévention, Mozambique, comportement sexuel, rural, personnes mariées.

Introduction

The HIV epidemic in southern Africa is well documented, with some countries registering prevalence decreases (Hallett, Aberle-Grasse, Bello *et al.*, 2006), while others experience dramatic increases (UNAIDS, 2007). Such is the case in Mozambique, where it was recently reported that 'the epidemic has again started to increase in all three [regional] zones after appearing to have stabilized in the early 2000s' (UNAIDS, 2007, p. 17).

The current HIV prevalence in Mozambique is 16.2%, with the first AIDS case reported in 1986. However, sentinel data show that the country-wide prevalence is not homogeneous, indicating several regional epidemics in the north, central and southern regions (National AIDS Council, 2008). The highest HIV prevalence is in the central province of Sofala, with an official rate of 26.5%, with the provincial capital, Beira, registering 34% (MISAU, 2006). This high HIV seroprevalence is dramatically impacting on the surrounding rural areas, as

Bruce H Noden is currently a researcher in the School of Biological Sciences at Illinois State University. His research focuses on the diverse external factors which influence infectious disease transmission in developing countries. At the time of the study, he was a lecturer in the Faculty of Health Sciences and assisted with infectious disease research projects in the Centre for Medical Research at the Catholic University of Mozambique in Beira.

Aurelio Gomes is currently a Research Assistant Professor in the Division of Infectious Diseases of the Department of Medicine in the University of Pittsburgh as well as the Director of the Centre for Medical Research in the Catholic University of Mozambique in Beira. At the time of the study, he was a lecturer in the Faculty of Health Sciences as well as the director of the Centre for Medical Research.

Aldina Ferreira is currently involved in research. At the time of the study, she was Field Coordinator for HIV/AIDS surveys conducted in the southern part of Sofala Province as part of the Centre for Medical Research in the Catholic University of Mozambique.

Correspondence to: bhnoden@ilstu.edu

the region recently experienced the epidemiological transition from HIV infection to AIDS cases. A recent mortality trend study between 1985 and 2005 showed that AIDS has become the main cause of death in the Central Hospital in the city of Beira (Gomes & Noden, unpublished data).

Recently, an initiative was undertaken to address the HIV situation in the rural southern area of Sofala province, namely Buzi, Chibabava and Machanga districts (HIV prevalence of 29%, 13% and 9%, respectively) (MISAU, 2006). Funded by the Conselho Nacional de Combate de HIV/SIDA (CNCS) (National Council for the Fight against HIV/AIDS), the timing was critical because the CNCS has financially supported HIV prevention strategies in the region since 2001 without a solid baseline household survey (CNCS, 2000; 2004). During that period, the HIV prevalence in Beira increased from 18% to 34% (MISAU, 2006). With the frequent movement of persons between the urban centre and the rural areas, it has not been possible to gauge the success of any regional prevention programme without knowing what the local population knows about HIV/AIDS and what they are doing with the information. Therefore, the purpose of this study was to identify factors possibly driving the HIV epidemic in rural southern Sofala province, so as to develop culturally relevant and effective prevention strategies.

Methods

Population and sampling

Between August and September 2005, a structured behaviour surveillance survey was conducted with married and previously married persons 15 - 49 years old in the Machanga, Chibabava, and Buzi districts of the southern part of the Sofala province in central Mozambique. Between 1 August and 20 September 2005, subjects were recruited, and informed oral consent staged by procedure was obtained from the subjects. The survey was based on the Indicators of Prevention of the WHO/Global Programme against AIDS (OMS/GPA) survey used in Zambia (Ministry of Health, 1999). The survey was modified to accommodate local cultural values, and was translated into Portuguese as well as the local dialect, Chindau, and pretested for the local context. All interviewers were fluent in the local dialect, and trained specifically to present the questions in culturally sensitive ways that would be respectful of and understood by local persons. The questionnaire considered demographic details, condom use, marital status and spousal details, extramarital sexual behaviour, history and knowledge of sexually transmitted infections (STI), and in-depth knowledge of HIV/AIDS prevention. As the survey was carried out with married and previously married persons, risky behaviour was defined as casual sexual encounters in the past 12 months. Married persons in the study were asked whether they were

'legally' married or 'traditionally' married, or cohabitating. These categories were decided by combining reported marital types found in Mozambique (Arnaldo, 2004).

The study area was composed of 450 family aggregates used as enumeration areas in the 1997 census (INE, 1999). We used the most current census data available, as censuses are only carried out every ten years in Mozambique. The technique used for this survey was to work by conglomerates, which were chosen randomly based on the survey size. Within each district, 30 conglomerates were selected randomly and 15 houses were randomly chosen within each conglomerate. To begin in a particular conglomerate, an interviewer listed all the houses in the area and 15 houses were randomly chosen.

On the day of the interview, one male and one female interviewer would go to the chosen family units and fill in two types of questionnaires. One questionnaire focused on the whole family aggregate, and the other on each individual who was chosen to be interviewed for the survey. The principal objective of the family aggregate survey was to list all the members of that family unit, for both sexes, and by this means identify eligible persons for the survey. To be eligible for the survey, one had to have slept the night before in that particular house, be married or previously married, and between the ages of 15 and 49 – a standard age range for these types of surveys (Font, Puigpinos, Chichango, Cabrero & Borrell, 2006; Ministry of Health, 1999). Once the eligible person was identified and agreed by informed consent to participate, they went with a same-sex interviewer to a private place to complete the individual survey. If a certain person was not available on a particular day, the interviewer would visit the home a further two times to try and obtain the interview. If the person was not present after three attempts, the survey was not filled out.

Validity analysis

As misreporting is common in sexual behaviour surveys, it was necessary to establish the validity of this sexual behaviour study by minimising possible biases, and evaluating internal and external validity (Buve, Lagarde, Carael *et al.*, 2001; Dare & Cleland, 1994; Schopper, Doussantousse, & Orav, 1993). Response bias was addressed by using trained, same-sex interviewers from the Instituto Nacional de Estatísticas (National Institute of Statistics) (INE), fluent in the local dialect and trained specifically to present the questions in culturally sensitive ways. Well-known for their survey work, including the national census, INE is trusted in the local community. Additionally, permission was obtained from local chiefs and governmental authorities in each enumeration area, which also built trust with those being interviewed. Following Schopper

et al. (1993), Dare & Cleland (1994) and Buve *et al.* (2001), internal validity was analysed by focusing on the responses of monogamous couples for mean number of years married, age of spouses, and numbers of sexual encounters in the past week. Significant discrepancies would indicate the possibility that those interviewed were not providing valid responses, leading to a recall bias in the results. We also compared responses to the number of wives among polygamous families. External validity was confirmed by comparing our data with differences in religious affiliation and percentages of separated/divorced persons and widows from the 1997 Census data (INE, 1999) collected from central region of Mozambique.

Statistical analysis

Data were analysed by Epi-Info 3.2.2. Socio-demographic characteristics were evaluated and comparisons between groups were made using χ^2 tests for proportions, and *t* tests and ANOVA for continuous variables. Univariate analysis was carried out on three dependent variables: sexual relations with a non-regular partner in the past 12 months, condom usage, and

knowledge of ABC prevention methods. A *p*-value of less than 0.05 was considered statistically significant for all tests.

Results

Study population

Of the 847 persons interviewed, 537 (63.4%) were women and 310 (36.6%) were men. The mean ages (and SD) of the men and women interviewed were 34.8±7.6 and 29.7±8.0 ($p=0.0000$). The main characteristics of the study population are shown in Table 1. A total of 92.4% of the interviewed population was rural. Only 25.9% of the women had any formal education compared with 81.2% of the men ($p=0.000$). In the previous month, 28.7% and 9.2% of the men and women, respectively, were absent for more than one night. Moreover, 65% of the men were away because of work, while women were absent because of family issues (21.2%), visits to someone ill, or funerals (31.3%), or religious activities (12.5%). Daily media exposure differed between sexes: 65.1% of men listened daily to the radio compared to 32.0% of females ($p=0.000$). Newspaper access was low among literate respondents, with only 0.9% of men

Table 1. Characteristics of study population

Characteristic	Men (%)	Women (%)	<i>p</i> -value
Sex	36.6 (N=310)	63.4 (N=537)	
Mean age (± SD)	34.8 ± 7.6	29.7 ± 8.0	0.0000
Age group			
<30	31.9	57.8	
31- 40	42.6	31.8	
>41	25.5	10.4	0.0000
Religion			
Catholic	17.5	20.0	
Protestant	23.6	23.0	
Muslim	1.9	1.3	
Zionist	30.7	36.4	
No religion	26.2	19.3	0.1159
Education			
No formal education	18.8	74.1	
Primary	66.2	22.7	
Secondary	10.1	1.3	
University	0.3	0	
Other	4.5	1.9	0.0000
Ethnicity			
Ndau	92.3	95.9	
Other	7.7	4.1	0.0241
Marital status			
Legally married	24.4	32.9	
Traditional/living together	69.1	45.6	
Separated/Divorced	2.9	9.7	
Widows	3.6	11.8	0.0000
Number of wives			
1	74.6	61.2	
2	19.4	29.8	
>2	3.5	7.4	
Not recorded	2.5	1.6	0.0000

and 3.2% of women reporting daily access in the past month ($p=0.0023$).

Validity

The reported mean number of years married for monogamous couples did not differ significantly between males (11.0 ± 7.0) and females (11.1 ± 8.2) ($p=0.8032$). The ages of the spouses reported among monogamous couples were similar, with the self-reported age of the men at 34.8 ± 7.6 years compared with wife-reported age of 34.9 ± 10.4 . The self-reported age of women was 29.7 ± 8.0 years compared with the husband-reported age of 27.7 ± 7.7 . The mean number of sexual encounters per week reported between monogamous couples were 1.4 ± 1.9 and 1.3 ± 1.5 for males and females, respectively ($p=0.5392$). Finally, the number of wives reported by polygamous males and females did not differ significantly ($p=0.3069$).

External validity was evaluated using the 1997 Census data (INE, 1999) to compare differences in religious affiliation and percentages of separated/divorced persons and widows. Regarding religion, there was a decrease of those claiming to be part of no religion – 45.1% (INE, 1999) v. 21.8% (current study), and an increase in participation in Zionist churches – 17.7% (INE, 1999) v. 34.4% (current study) and other Christian denominations – 16.3% (INE, 1999) v. 23.2% (current study). While percentages of separated/divorced men were similar, differences were found for women, namely 4% (INE, 1999) v. 9% (current study).

Sexual behaviour and STIs

At the time of study, 94.7% of the men and 80.0% of the women reported living in a marital relationship, with the remaining respondents being separated, divorced or widows. In addition, 21.9% and 6.5% of men and women, respectively, reported engaging in casual sexual relationships in the past year. Table 2 presents the univariate analysis of factors linked to non-regular sexual activity, condom usage, and knowledge of ABC prevention methods. Married males were more likely to have engaged in casual encounters with other women besides their wives in the past year (Table 2). Of the 68 men engaged in non-regular encounters, 88.3% were married, with 71.2% reporting only one spouse; 55.9% of the casually active males had one partner in the past year while 29.4% had two or more partners; and 14.7% did not recall. Of the men in polygamous marriages, 52.9% had two or more partners compared with only 40.5% of men in monogamous marriages. In addition to married males, no-longer married females were strongly associated with risky sexual activity, with 82.9% of this subgroup reporting casual encounters with men in the past year, a majority (88.6%) of whom had only one partner. With regard to the marital

status of non-regular partners, 61.7% of the casual partners of married men were unmarried women, compared with 92.3% of the partners of previously married men ($p=0.0388$). Differing from the men, 40% of the married women had unmarried male partners, while 90.3% of previously married women had married male partners ($p=0.0056$). When asked whether it was acceptable for married men to have sexual relations outside of marriage, 20.7% answered 'Yes,' with no significant differences between sexes ($p=0.1564$). Interestingly, 15.1% of women who thought it acceptable for married men to have casual partners had engaged in risky sex in the past year, compared with only 4.1% who said it was not acceptable ($p=0.0000$). There was no significant difference between married and previously married males ($p=0.3333$). When asked whether a man could be satisfied with only one woman, 65.5% and 53.8% of males and females, respectively, agreed ($p=0.0009$).

For males, mobility was a factor for risky activity, particularly for legally married males, 66.7% of whom participated in extramarital relationships in the past month while away from home. This was compared with 38.9% of traditionally married/cohabitating men and 20% of no longer married males, both of whom had casual partners from the same community.

Casual sexual activity was associated with education (OR=2.70, 95%CI: 1.75-4.18, $p=0.0000$) as well as involvement in particular Christian churches (Table 2). When compared with Zionist churches, casual sexual activity was associated with those who attended Catholic and Protestant churches. Of the 13 Muslims interviewed, none reported non-regular activity.

Those who were casually active had an increased risk for genital discharge and ulcers (Table 2). Among at-risk males, urethral discharge was reported by 15.6%, compared with 3.2% of those not casually active in the past year ($p=0.0002$). Of those reporting discharge, all were married, 80% legally married. Genital ulcers were reported by 20% of men engaged in casual sex in the past year, compared with 2.3% of non-active males ($p=0.0000$). Of those reporting ulcers, 94.4% were married, 53.8% legally married. Among 29 casually active women in the past year, 20.7% reported vaginal discharge and 6.9% reported genital ulcer, compared with 12.3% ($p=0.0195$) and 7.9% ($p=0.0852$), respectively, of 'non-active' women. However, among all women, the married women with no admitted casual partnerships in the past year reported the majority of discharge (84%) or ulcers (86.7%). Univariate analysis demonstrated that discharge was significantly associated with being female (OR=2.32, 95%CI: 1.26-4.25, $p=0.0066$) and being 'non-active' (OR=3.33, 95%CI: 1.75-6.34, $p=0.0003$). Self-reported ulcers was associated with three or more casual partners in the past year (OR=15.56, 95%CI: 2.96-81.96, $p=0.0012$), as 61.5% of

Table 2. Univariate analysis of independent factors associated with 3 outcome variables of married and previously married adults

	Extramaritally active		Condom usage		ABC knowledge*	
	Odds ratio (CI 95%)	p-value	Odds ratio (CI 95%)	p-value	Odds ratio (CI 95%)	p-value
Sex						
Male	4.03 (2.61-6.23)	0.0000	2.11 (1.43-3.10)	0.0002	6.32 (4.64-8.60)	0.0000
Female						
Age						
<30	0.95 (0.49-1.82)	0.8724	2.19 (1.07-4.49)	0.0324	0.67 (0.44-1.00)	0.0526
31-40	1.27 (0.69-2.33)	0.4356	2.46 (1.23-4.92)	0.0113	0.49 (0.33-0.73)	0.0004
>40						
Marital status						
Married	3.49 (2.22-5.49)	0.0000	1.62 (0.77-3.40)	0.2010	1.71 (1.15-2.54)	0.0081
No longer married						
Educated						
Yes	2.70 (1.75-4.18)	0.0000	3.55 (2.34-5.40)	0.0000	2.74 (2.06-3.64)	0.0000
No						
Level of education						
Middle school (6-7)	1.08 (0.39-2.96)	0.8875	1.49 (0.61-3.68)	0.3817	0.10 (0.47-2.14)	0.9944
Secondary school (8-12 grades/ university)	1.76 (0.89-3.48)	0.1018	4.21 (2.30-07.73)	0.0000	2.60 (1.40-4.86)	0.0026
Other (trade schools)	1.72 (0.18-16.88)	0.6412	1.57 (0.16-15.35)	0.7001	1.07 (0.15-7.68)	0.9475
Primary (1-5)						
Religion						
Protestant	2.65 (1.50-4.67)	0.0008	1.44 (0.87-2.38)	0.1615	1.12 (0.77-1.63)	0.5612
Muslim	0.0000 (0.0->1.0E12)	0.9696	2.05 (0.54-7.80)	0.2917	1.58 (0.52-4.83)	0.4222
Catholic	1.93 (1.03-3.60)	0.0397	1.26 (0.73-2.18)	0.4139	1.35 (0.91-2.00)	0.1386
Not religion/Animists	1.83 (0.99-3.37)	0.0530	1.03 (0.59-1.78)	0.9281	1.30 (0.89-1.90)	0.1795
Zionist						
Discharge						
Yes	2.50 (1.37-4.57)	0.0030	2.57 (1.46-4.55)	0.0012	0.74 (0.43-1.25)	0.2549
No						
Ulcer						
Yes	3.67 (1.92-7.03)	0.0001	3.58 (1.92-6.70)	0.0001	0.64 (0.34-1.21)	0.1713
No						

* Knowledge of ABC HIV prevention methods: A-abstinence; B-Be faithful; C-Use a condom.

males had engaged in casual sex with more than one partner. STIs were not significantly associated with religion (discharge ($p=0.3350$) or ulcers ($p=0.7611$)) or education level (discharge ($p=0.5583$) or ulcers ($p=0.5011$)).

Health-seeking behaviour

The majority of respondents with an STI (68.8%) resolved their infections by seeking treatment in the government health system or going to a traditional healer (50.5%). More women (89.4%) than men (59.1%) informed their partner of their STI symptoms, while 68% and 51.1% of men and women, respectively, stopped having sexual relations while they were infected.

Transactional sex

Of the men, 46.5% reported giving money after their last non-marital encounter, while 67.6% of the women reported receiving money. No married women received money, while 78.1% of

previously married women received money and/or gifts after their last casual encounter ($p=0.0024$). Gifts included food, clothing and soap, and were given only in partnerships lasting more than five months.

General knowledge of STIs and HIV/AIDS

Knowledge of STIs was higher among males (89.7%) than females (75.8%) ($p=0.0000$). Of the total respondents, 57.0% agreed that a woman could do nothing to protect herself from an STI-infected husband. Of the men who agreed that a woman could protect herself, 93.2% said that a woman could insist that her husband use a condom, and 74.2% suggested that the woman could refuse to have sex with her husband. For women agreeing that STI protection was possible, 56.7% opted for medications, 51.0% said that a woman could refuse sex with her husband, and 37.8% responded that a woman could insist that her STI-infected husband use a condom.

Table 3. HIV prevention knowledge and practice

	Men (%)	Women (%)	p-value
Had heard about condoms	98.7	86.6	0.0000
Ever used a condom	21.0	13.5	0.007
Condom use with last sex with spouse	1.6	1.0	0.1212
Condom use with last sex with casual partner	33.7	5.4	0.0008
Prompted responses of HIV prevention methods			
Delay of debut	87.0	45.1	0.0000
Reduction of partners	74.5	72.1	0.4398
Use of condoms	88.4	76.7	0.0000
ABC HIV prevention knowledge	65.5	23.1	0.0000

Almost all respondents (98.8%) had heard of HIV/AIDS, and 88.3% reported knowing at least one way to prevent HIV/AIDS. While 71.6% of respondents recognised that an apparently healthy person could be infected with HIV, only 6.4% had done an HIV test. In the study area, there was a high knowledge of condoms and where they could be purchased, but low usage (Table 3). General condom usage was significantly associated with being male, being younger than 40 years old, being educated, and knowing ABC prevention methods (Table 2). With regards to education, condom usage was associated with having an 8th grade (OR=6.39, 95%CI: 1.18-34.62, $p=0.0315$) or 12th grade (OR=10.22, 95%CI: 1.4-69.76, $p=0.0177$) education. Interestingly, living in a rural community was associated with knowledge about condoms (OR=1.90, 95% CI: 1.08-3.36, $p=0.0256$), but condom usage was associated with living in an urban centre (OR=2.10, 95% CI: 1.15-3.84, $p=0.0152$). Condom usage was also associated with genital discharge and ulcers in the past year (Table 2), as well as engaging in casual sex (OR=3.84, 95% CI: 2.41-6.10, $p=0.0000$). Condom usage with non-regular partners was associated with being male (OR=8.38, 95% CI: 1.90-36.90, $p=0.0049$), having an education above 12th grade (OR=8.22, 95% CI: 3.03-22.30, $p=0.0000$), and being Protestant (OR=3.46, 95% CI: 1.27- 9.45, $p=0.0156$).

Knowledge of HIV prevention methods was divided into individual responses as well as by an ABC index (Table 3). The ABC index is a measure of respondents who mentioned all three aspects of ABC prevention (Abstinence, Be Faithful, and Condom usage) in their responses. ABC HIV prevention knowledge was associated with being male, being educated (specifically having a secondary school level), being married, and over 40 (Table 2). Both sexes registered low prompted responses, with males registering almost a three times higher knowledge of ABC prevention methods compared with females (Table 3). In general, males and females did not differ in their responses concerning partner reduction, but women responded significantly lower than males for both delay of debut (abstinence) and use of condoms. Encouragingly, a

prompted knowledge of condoms was significantly associated with condom usage (OR=2.98, 95%CI 1.52-5.82, $p=0.0014$).

Cultural beliefs and practices

Circumcision in this part of Mozambique is not common, with only 11.3% males and 4.7% females reporting being circumcised. Widow inheritance has been commonly practised among the Ndau people and is a concern in spreading HIV to other family members (Okeyo & Allen, 1994). The vast majority of respondents (94.6%) had heard of 'inheritance', and 84.3% of those who had heard, knew someone who had been inherited. Among women, knowledge of those who had heard of someone who had been inherited decreased by age – women in their 40s (92%), 30s (88%), 20s (85%) and under 20 (82%) ($p=0.1062$).

Discussion

This is the first household-based survey from rural central Mozambique, detailing the practices, knowledge and sexual behaviour of married and previously married persons. The results are timely for the Conselho Nacional de Combate de HIV/SIDA (National Council for the Fight against HIV/AIDS) which has financed regional HIV prevention strategies in the area since 2001 (CNCS, 2000; 2004), but has yet to implement behavioural surveillance surveys for most-at-risk populations (National AIDS Council, 2008). Providing a solid baseline, this study identified specific factors which may be contributing to the spread of HIV in rural southern Sofala province. While similar studies have focused on small urban areas in Mozambique (Font *et al.*, 2006), it is not advisable to generalise the Mozambican HIV epidemic and compare it with neighbouring countries for several reasons: (1) HIV prevalence in the capital city (Maputo), until recently, appeared to be lower than in other areas of the country; (2) the levels of infection in the rural areas (where 80% of the population live) may be as high or higher than in urban centres; and (3) there may be several regional epidemics in progress, based on differences in HIV infection rates in the three different regions (National AIDS Council, 2008; UNAIDS, 2007).

To identify factors driving the HIV epidemic in rural southern Sofala province, the understandings, beliefs and behaviour related to HIV transmission needed to be surveyed, in order to identify the local cultural values, economic challenges, and religious beliefs from which to develop relevant HIV prevention strategies (Latkin & Knowlton, 2005; Wilson, 2004).

In general, we found knowledge, behaviour and practices which are common to other rural African populations at risk for HIV. These factors included mobility (Kishamawe, Vissers, Urassa *et al.*, 2006; Lurie, Williams, Zuma *et al.*, 2003; Mtika, 2007); casual multi-partnering (Malamba, Wagner, Maude *et al.*, 1994); mixing of older married males with younger unmarried females (Glynn, Carael, Buve, Musonda, Kahindo *et al.*, 2003; Meekers & Calves, 1997); transactional activities of widows and separated/divorced women (Gomo, Chibatamoto, Chandiwana, & Sabeta, 1997; Wilkins, Ricard, Todd, Whittle, Dias, & Da Silva, 1993); the infrequent use of condoms (Hartung, Nash, Ngubane, & Fredlund, 2002); and the association of casual sex with higher education (Smith, Nalagoda, Wawer *et al.*, 1999); and STI levels, particularly genital ulcers, in the local population (Chan, 2006; Gomo *et al.*, 1997; Malamba *et al.*, 1994). While identifying common HIV risk factors, the results and future implications need to be interpreted within the cultural setting.

Southern Sofala province consists primarily of Ndau people, governed by strong cultural norms, unlike the provincial capital city of Beira, where different ethnic groups mix in an urban environment. An area heavily affected by cyclones and droughts and high rates of unemployment, it is deemed necessary for men to leave to find work and/or food to support their families. This is reflected by the sex differential for those interviewed. The male-female ratio in the current study was 58 males for every 100 females, compared with the official rate of 65 - 95 males for every 100 females (INE, 1999). This was mainly due to three factors: (1) a devastating drought was taking place at the time of the survey, which meant that many men had left to find food; (2) a main source of income for many families in this region is to find jobs in the major cities in Mozambique (Beira or Maputo) or to work in the mines in South Africa (principally from the district of Chibabava); and (3) polygamy is widely practised in this region, with more than a quarter of the respondents reporting a polygynous household. This practice is deemed necessary to keep the homestead going while the husband works elsewhere for most of the year (Bove & Valeggia, 2009; Noden & Gomes, personal interviews).

As polygamy is acceptable in the region, it is possible that many casual encounters were actually males procuring another wife among local younger, unmarried women (Bove & Valeggia,

2009). However, the survey identified a high-risk group among legally married males who work/live away from home. This group reported two or more casual partners (usually occurring when working away from home) as well as higher STI rates compared with 'non-active' males. Another result demonstrating this risk group was that the married women, who reported virtually no casual partners, had the highest STI rates, most likely infected by their husbands. While also reported by other rural studies (Gomo *et al.*, 1997; Kishamawe *et al.*, 2006; Lurie *et al.*, 2003), the solution is complex. Most HIV prevention programmes, including those advocated by the CNCS (National AIDS Council of Mozambique), support individual ABC prevention measures, spending money on seminars and education. However, the promotion of individual HIV prevention interventions does not take into account the cultural and economic environment of central Mozambique. The reason why most of these married males are away from their families and exposed to HIV risk through casual relationships is due to lack of opportunity to earn a living income at home. A successful HIV prevention programme in this region needs to envision economic opportunities, in addition to HIV prevention strategies, to reduce the HIV risk associated with married males working for long periods away from their families (Dworkin & Ehrhardt, 2007; Mtika, 2007).

This study also highlighted the particular vulnerability of divorced/separated women and widows. Most of those engaged in risky relationships were involved with married men, had higher STI rates, reported low condom usage and received money/gifts after their last encounter. These women obviously had subsistence needs for themselves and their children, which brings in a set of social 'rules' which are rooted in a polygynous society (Poulin, 2007). The exchange of sex for money and material goods has received much attention (Alary & Lowndes, 2004; Cote, Sobela, Dzokoto *et al.*, 2004; Dunkle, Jewkes, Brown, Gray, McIntyre, & Harlow, 2004), with a distinction being made between 'sex workers' and those who are simply motivated by basic survival needs for themselves and their children and are willing to exchange sex for something in return (Gysels, Pool, & Nnalusiba, 2002; Hunter, 2002). These women would not consider themselves 'sex workers' but are trading one 'commodity' (food, clothing, money, services) for another (sex). For example, one respondent, separated from her husband, reported that her last risky encounter took place when she did not have the money to pay a tailor for his work. While awareness of HIV and strategies for health could be improved among this sub-group, the issue, again, involves more than equipping these vulnerable women with individual HIV prevention strategies (Kim, Pronyk, Barnett & Watts, 2008). It is an economic issue that makes this sub-population vulnerable.

The low ABC index for both males and females highlights the need to educate about HIV in a culturally relevant way. A substantial number of those interviewed for HIV transmission facts answered either wrongly or did not know the answers. The observation that men knew more than women about HIV prevention measures was most likely due to their experience in urban areas, as well as having more opportunities to attend HIV prevention seminars. It was encouraging to see an association between condom knowledge and condom usage. However, these results differ from another condom usage study done in urban centres in Sofala province (Mola *et al.*, 2006). With one third of males reporting condom usage with their last casual partner, the accuracy is questionable, given the six times lower response for women. If condoms were being used, one would think the reported usage for both sexes would be more similar. These results possibly indicate that condom usage questions need to move beyond practice (i.e. how many are using condoms?) to the relevancy of the message being transmitted (i.e. what are local beliefs about condoms and their usage?).

In building culturally relevant HIV prevention programmes, valuing the cultural beliefs respected in the community (i.e. abstinence and fidelity) builds trust with community leaders. By this means of relationship-building, these programmes will speak 'through' local beliefs, instead of scandalising them, as so often happens with Western-funded HIV prevention programmes (Wilson, 2004). Instead of pulling out the wooden phallus in a mixed group of adults to demonstrate how to use a condom, it would be much more fruitful to spend the time to discover why condoms are not being used, even seek local understandings of sperm and what happens when it is 'wasted' (Coast, 2008; Thomsen, Stalker, & Toroitich-Ruto, 2004). Cultural practices involving sexual preferences dramatically impact condom acceptability, as was recently demonstrated in another part of Central Mozambique (Bagnol & Mariano, 2008). Recent declines in HIV prevalence in several countries have utilised these techniques, by linking the presentation of condom information together with delay of debut (Abstinence) and partner reduction (Be Faithful) in an ABC prevention 'package' (Green, 2003; Halperin, Steiner, Cassell *et al.*, 2004; Shelton, Halperin, Nantulya *et al.*, 2004). Adoption of the ABC prevention message has also been shown to promote acceptance and build trust among local traditional and religious leaders, which would greatly facilitate the 'flow' of concepts into the community (Agadjanian, 2005; Gregson, Zhuwau, Anderson, & Chandiwana, 1999; Lagarde, Enel, Seck *et al.*, 2000; Pfeiffer, 2004).

One of the findings indirectly assessed by the survey was women's lack of empowerment to make important decisions relating to their sexual health. Firstly, one in five women found

it acceptable for men to be unfaithful. Secondly, women in this region have limited access to any media sources (radio and newspapers) which could provide minimal HIV prevention information. Few have had any formal education at all. Thirdly, there was a low level of knowledge concerning HIV and STIs among women. Fourth, a majority of men and women agree that women have no means to prevent STIs from their husbands, even while reporting mid-levels of knowledge of HIV prevention methods, particularly condom usage. When prevention methods are known but unable to be practised, it is probable that a high level of insecurity exists among women in regards to their sexual health. Added to this insecurity is an apparent opinion by interviewed men that women do have an ability to control their sexual health. When asked what a woman could do to protect herself, a vast majority of men responded that she could insist that her husband use a condom and/or refuse to have sex with her husband. However, this perception is countered by low numbers of women who agreed. Revealingly, a majority of women opted for purchasing medications to 'protect' themselves from STIs. This appears to be a passive reaction to a situation where women cannot choose healthy options. While further in-depth studies are needed, our interviews suggest that it is highly unlikely for a woman to be able to insist on a condom or refuse to have sex with her husband, given the strong cultural values related to sexual 'rules' within marriage. The cultural values placed on the sexual relationship between men and women mean that few husbands and wives discuss their sexual relationships unless it is absolutely obvious and unavoidable (Bove & Vallengia, 2009; Lambert & Wood, 2005; Noden, personal interviews). Finally, the inability of women to control their sexual health is reflected in reported condom usage among those with casual partners. Only one in 20 women claimed to have used condoms in their last encounter compared to one in three males. While it is possible that women under-reported their encounters (Nnko, Boerma, Urassa, Mwaluko, & Zaba, 2004), others have also reported this difference in Mozambique (Font *et al.*, 2006). Obviously, more regional qualitative research needs to uncover whether the lack of empowerment of women to make healthy choices can be addressed by culturally-sensitive instruction (Kim *et al.*, 2008; Tawfik & Watkins, 2007).

A valuable result from the survey highlighted the importance of regional religious entities. It was interesting to find an association of risky behaviour with those claiming to be Catholic or Protestant, compared with those in Zionist churches. Several points need to be clarified to highlight the significance of this finding. Firstly, a majority of respondents aligned themselves to a particular church or belief system instead of claiming not to be religious. As local customs and beliefs are so important in

this region, even those claiming to be 'non-religious' may not align themselves to a particular 'religion' but in all likelihood, follow particular local cultural religious beliefs (Pfeiffer, 2005). Secondly, under Portuguese colonisation, Catholics set up clinics and schools in the region, in addition to churches which are still present. This presence produced a regional affiliation to the Catholic Church which has only recently begun to diminish. Over the past 30 years, there has been a dynamic influx of Protestant groups as well as African Independent Churches, which are Apostolic and Zionist, some with very strong beliefs on faithfulness in marriage and abstinence (Pfeiffer 2002; 2005). In an illuminating study from Zimbabwe, which compared Zionist church practices with other churches, Gregson, Zhuwau, Anderson and Chandiwana (1999) identified that, while polygamy was acceptable (a cultural norm), those in Zionist churches tended to be more restrictive on members' extra-martial relationships.

Given the obvious importance of religious life, it is imperative that future interventions specifically target churches, to build trust and develop culturally relevant HIV prevention strategies (Green, 2003; Lagarde *et al.*, 2000; Pfeiffer, 2004). This important link with local churches should involve specific training related to local HIV issues, not just general HIV information (Agadjanian, 2005; Pfeiffer, 2004). Training should include home care, orphan care, youth development, marriage building, and family dynamics (Agadjanian, 2007). Recently, culturally-appropriate materials have been developed by local religious NGOs (i.e. Kutatsirana (Chimoio)) with positive results. As the overall economic development of Mozambique continues to bypass this rural area, it is all the more important to provide culturally relevant tools with which not only to survive the changes but also improve social relationships.

Although the current study attempted to minimise various biases, misreporting cannot be ruled out (Buve *et al.*, 2001; Dare & Cleland, 1994; Schopper *et al.*, 1993). In general, both internal and external validity was achieved, as several biases were minimised by study development and built-in questions. Admittedly, one weak area was that the study did not occur in a closed community, so there may be differences between sexes, as we did not control who actually participated. While recognising the importance of using current population data to maximise the outcomes of prevention programmes, the differences observed in religion between the Census 1997 data and the current study can be explained simply by regional changes occurring over the past ten years. With a notable increase in the number of independent African churches in the region (Pfeiffer, 2002; 2005), it is logical that there would be a decrease among those claiming to be part of no religion,

and an increase among those claiming participation in Zionist and other Christian denominations. Differences in numbers of widows can be explained by the origin of the data. While our current study focused in the southern region of the Sofala province, the data used for external validity came from the whole province (INE, 1999), including areas with a completely different indigenous makeup. Therefore, differences are to be expected. The objective of evaluating validity was to look for broad relationships, and these were adequately found.

In conclusion, this survey provided a solid baseline on which to develop a culturally relevant HIV programme in the southern part of Sofala province. In addition to training in individual preventative strategies (ABC), this survey demonstrated a broader need to focus on the needs of specific at-risk groups, create options for economic development, disseminate relevant and sensitive information about HIV, and integrate religious groups into solutions. A recent idea to include gender relations, economics and migration (GEM) in HIV prevention strategies is on target, when focusing on the specific needs and risk factors encountered in this rural area of Mozambique (Dworkin & Ehrhardt, 2007). Additionally, more focus needs to be given to increasing awareness about the importance of male circumcision for HIV prevention (Sawires, Dworkin, Peacock, Szekeres, & Coates, 2007), and the possible reduction in the practice of widow inheritance in the region. It is anticipated that by including regional cultural values, economic challenges and religious beliefs, the resulting HIV prevention programme will both educate and be relevant and sensitive to the needs of this rural community.

Acknowledgements

Our grateful thanks to Rev. Dr. Francisco Ponsi for his assistance with this project, and the Instituto Nacional de Estatísticas de Moçambique, Delegação da Beira, for their support in training and data collection. Special thanks to two anonymous reviewers for their helpful suggestions. BHN would like to specifically thank his colleagues in both AIM International (Mozambique) as well as UCM for the many helpful discussions in putting these ideas together. This study was made possible by grants from CNCS-Sofala (Contract N° 187) and CIPRA (National Institutes of Health, USA #1 R03 AI056325-01).

Ethical approval for this study was obtained from the Catholic University of Mozambique Ethics Committee (Beira) as well as the National Commission of Bioethics of the Mozambique Ministry of Health (Maputo). This work is attributed to the Centro de Pesquisa Médica, Universidade Católica de Moçambique, Beira, Mozambique.

References

- Agadjanian, V. (2005). Gender, religious involvement, and HIV/AIDS prevention in Mozambique. *Social Science and Medicine*, 61, 1529-1539.
- Agadjanian, V. (2007). Promises and challenges of faith-based AIDS care and support in Mozambique. *American Journal of Public Health*, 97(2), 362-366.
- Alary M. & Lowndes, C.M. (2004). The central role of clients for female sex workers in the dynamics of heterosexual HIV transmission in sub-Saharan Africa. *AIDS*, 18(6), 945-947.
- Arnaldo, C. (2004). Ethnicity and marriage patterns in Mozambique. *African Population Studies*, 19(1), 145-163.
- Bagnol, B. & Mariano, E. (2008). Vaginal practices: eroticism and implications for women's health and condom use in Mozambique. *Culture, Health and Sexuality*, 10, 573-585.
- Bove, R. & Vallenggia, D. (2009). Polygyny and women's health in sub-Saharan Africa. *Social Science and Medicine*, 68, 21-29.
- Buve, A., Lagarde, E., Carael M., Rutenberg, N., Ferry, B., Glynn, J.R., Laourou M., Akam, E., Chege, J., & Sukwa, T., for the Study Group on Heterogeneity of HIV Epidemics in African cities (2001). Interpreting sexual behaviour data: validity issues in the multicentre study on factors determining the differential spread of HIV in four African cities. *AIDS*, 15 (Suppl 4), S117-S126.
- CNCS. (2000). Plano Estratégico Nacional de Combate às DTS/HIV/SIDA em Moçambique: 2000-2002, Grupo Multisectorial de Planificação, Conselho de Ministros da Republica de Mocambique. URL (<http://www.inde.gov.mz/docs/polsaude7.pdf>) – last accessed 15 May 2009.
- CNCS. (2004). Plano Estratégico Nacional de Combate às DTS/HIV/SIDA em Moçambique: 2004-2009, Grupo Multisectorial de Planificação, Conselho de Ministros da Republica de Mocambique, 11/2004. URL (<http://www.cncs.org.mz/PENII.pdf>) – last accessed 15 May 2009.
- Chan, D.J. (2006). Fatal attraction: sex, sexually transmitted infections and HIV-1. *International Journal of STD & AIDS*, 17, 643-651.
- Coast, E. (2008). Wasting semen: Context and condom use among the Maasai. *Culture, Health and Sexuality*, 9, 387-401.
- Cote, A.M., Sobela, F., Dzokoto, A., Nzambi, K., Asamoah-Adu, C., Labbe, A.C., Masse, B., Mensah, J., Frost, E. & Pepin, J. (2004). Transactional sex is the driving force in the dynamics of HIV in Accra, Ghana. *AIDS*, 18, 917-925.
- Dare, O.O. & Cleland, J.G. (1994). Reliability and validity of survey data on sexual behaviour. *Health Transition Review*, 4(Suppl), 93-110.
- Dunkle, K.L., Jewkes, R.K., Brown, H.C., Gray, G.E., McIntyre, J.A., & Harlow, S.D. (2004). Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Social Science and Medicine*, 59, 1581-1592.
- Dworkin, S.L. & Ehrhardt, A.A. (2007). Going beyond 'ABC' to include 'GEM': Critical reflections on progress in the HIV/AIDS Epidemic. *American Journal of Public Health*, 97(1), 13-18.
- Font, A., Puigpinos R., Chichango, I.E., Cabrero N., & Borrell, C. (2006). AIDS-related knowledge and behaviours in Mozambique. *Revue d'Epidémiologie et de Santé Publique*, 54, 341-354.
- Glynn, J.R., Carael, M., Buve, A., Musonda, R.M., Kahindo, M. and the Study Group on the Heterogeneity of HIV Epidemics in African Cities. (2003). HIV risk in relation to marriage in areas with high prevalence of HIV infection. *Journal of Acquired Immune Deficiency Syndromes*, 33, 526-535.
- Gomo, E., Chibatamoto, P.P., Chandiwana, S.K. & Sabeta, C.T. (1997). Risk factors for HIV infection in a rural cohort in Zimbabwe: a pilot study. *Central African Journal of Medicine*, 43(12), 350-354.
- Green, E.C. (2003). *Rethinking AIDS Prevention: Learning from successes in developing countries*. Westport, CT: Praeger Publishers.
- Gregson, S., Zhuwau, T., Anderson, R.M., & Chandiwana, S.K. (1999). Apostles and Zionists: The influence of religion on demographic change in rural Zimbabwe. *Population Studies*, 53, 179-193.
- Gysels, M., Pool, R., & Nnalusiba, B. (2002). Women who sell sex in a Ugandan trading town: life histories, survival strategies and risk. *Social Science and Medicine*, 54, 179-192.
- Hallett, T.B., Aberle-Grasse, J., Bello, G., Boulos, L-M, Cayemittes, M.P.A., Chelugot, B. et al. (2006). Declines in HIV prevalence can be associated with changing sexual behaviour in Uganda, urban Kenya, Zimbabwe, and urban Haiti. *Sexually Transmitted Infections*, 82 (suppl 1), i1-i18.
- Halperin, D.T., Steiner, M.J., Cassell, M.M., Green, E.C., Hearst, N., Kirby, D., Gayle, H.D., & Cates, W. (2004). The time has come for common ground on preventing sexual transmission of HIV. *Lancet*, 364, 1913-1915.
- Hartung, T.K., Nash, J., Ngubane, N., & Fredlund, V.G. (2002). AIDS awareness and sexual behaviour in a high HIV prevalence area in rural northern Kwazulu-Natal, South Africa. *International Journal of STD & AIDS*, 13, 829-832.
- Hunter, M. (2002). The materiality of everyday sex: thinking beyond 'prostitution'. *African Studies*, 61(1), 99-120.
- INE (Instituto Nacional de Estatística). (1999). Recenseamento Geral de População e Habitação 1997: Indicadores Socio-Demográficos, Mocambique, Maputo: INE
- Kim, J., Pronyk, P., Barnett, T., & Watts, C. (2008). Exploring the role of economic empowerment in HIV prevention. *AIDS*, 22 (suppl 4), S57-S71.
- Kishamawe, C., Vissers, D.C.J., Urassa, M., Isingo, R., Mwaluko, G., Borsboom, G.J.J.M., Voeten, H.A.C.M., Zaba, B., Habbema, D.F., & de Vlas, S.J. (2006). Mobility and HIV in Tanzanian couples: both mobile persons and their partners show increased risk. *AIDS*, 20, 601-608.
- Lambert, H & Wood, K. (2005). A comparative analysis of communication about sex, health and sexual health in India and South Africa: Implications for HIV prevention. *Culture, Health & Sexuality*, 7, 527-541.
- Largarde, E., Enel, C., Seck, K., Gueye-Ndiaye, A., Piau, J-P, Pison, G., Dulaunay, V., Ndoye, I. & Mboup, S., for the MECORA group. (2000). Religion and protective behaviours towards AIDS in rural Senegal. *AIDS*, 14, 2027-2033.
- Latkin, C.A. & Knowlton, A.R. (2005). Micro-social structural approaches to HIV prevention: a social ecological perspective. *AIDS Care*, 17(suppl 1), S102-S113.
- Lurie, M.N., Williams, B.G., Zuma, K., Mkaya-Mwamburi, D., Garnett, G.P., Sturm, A.W., Sweat, M.D., Gittelsohn, J., & Karim, S.S.A. (2003). The impact of migration on HIV-1 transmission in South Africa. *Sexually Transmitted Diseases*, 30 (2), 149-156.
- Malamba, S.S., Wagner, H.U., Maude, G., Okongo, M., Nunn, A.J., Kengeya-Kayondo, J.F., & Mulder, D.W. (1994). Risk factors for HIV-1 infection in adults in a rural Ugandan community: a case-control study. *AIDS*, 8, 253-257.
- Meekers, D. & Calves, A-E. (1997). 'Main' girlfriends, girlfriends, marriage, and money: the social context of HIV risk behaviour in sub-Saharan Africa. *Health Transition Review*, 7 (suppl), 361-375.
- Ministry of Health (1999). *Zambian Sexual Behaviour Survey 1998*, Central Statistics Office, Measure Evaluation, Lusaka, Zambia.
- MISAU (2006). Apresentação de HIV em Sofala, CNCS (National Programme to Control STI/HIV/AIDS), Beira, Mocambique.
- Mola, O.D., Mercer, M.A., Asghar, R.J., Gimbel-Sherr, K.H., Gimbel-Sherr, S., Micek, M.A., & Gloyd, S.S. (2006). Condom use after voluntary counselling and testing in Central Mozambique. *Tropical Medicine and International Health*, 11, 176-181.
- Mtika, M.M. (2007). Political economy, labor migration, and the AIDS epidemic in rural Malawi. *Social Science and Medicine*, 64, 2454-2463.
- National AIDS Council (2008). Universal Declaration of Commitment on HIV and AIDS: Mozambique progress report for the United Nations General Assembly Special Session on HIV and AIDS 2006-2007. *Republic of Mozambique*. URL (http://data.unaids.org/pub/Report/2008/mozambique_2008_country_progress_report_en.pdf) - last accessed 15 May 2009.
- Nnko, S., Boerma, J.T., Urassa, M., Mwaluko, G., & Zaba, B. (2004). Secretive females or swaggering males? An assessment of the quality of sexual partnership reporting in rural Tanzania. *Social Science and Medicine*, 59, 299-310.
- Okeyo, T.M., & Allen, A.K. (1994). Influence of widow inheritance on the epidemiology of AIDS in Africa. *Africa Journal of Medical Practice*, 1, 20-25.
- Pfeiffer, J. (2002). African Independent Churches in Mozambique: Healing the afflictions of inequality. *Medical Anthropology Quarterly*, 16(2), 176-199.
- Pfeiffer, J. (2004). Condom social marketing, Pentecostalism, and structural adjustment in Mozambique: A clash of AIDS prevention messages. *Medical Anthropology Quarterly*, 18(1), 77-103.
- Pfeiffer, J. (2005). Commodity fetishism, the Holy Spirit, and the turn to Pentecostal and African Independent Churches in Central Mozambique. *Culture, Medicine and Psychiatry*, 29, 255-283.
- Poulin, M. (2007). Sex, money and premarital partnerships in southern Malawi. *Social Science and Medicine*, 65, 2383-2393.
- Sawires, S.R., Dworkin, A.F., Peacock, D., Szekeres, G. & Coates, T.J. (2007). Male circumcision and HIV/AIDS: challenges and opportunities. *Lancet*, 369, 708-13.
- Schopper, D., Doussantousse, S. & Orav, J. (1993). Sexual behaviours relevant to HIV transmission in a rural African population. *Social Science and Medicine*, 37(3), 401-412.
- Shelton, J.D., Halperin, D.T., Nantulya, V., Potts, M., Gayle, H.D. & Holmes, K.K. (2004). Partner reduction is crucial for balanced 'ABC' approach to HIV prevention. *British Medical Journal*, 328, 891-893.
- Smith, J., Nalagoda, F., Wawer, M. J., Serwadda, D., Sewankambo, N., Konde-Lule, J., Lutalo, T., Li, C., & Gray, R.H. (1999) Educational attainment as a

predictor of HIV risk in rural Uganda: results from a population-based study. *International Journal of STD & AIDS*, 10, 452-459.

Tawfik, L., & Watkins, S.C. (2007). Sex in Geneva, Sex in Lilongwe, and sex in Balaka. *Social Science and Medicine*, 64, 1090-1101.

Thomsen, S., Stalker, M., & Toroitich-Ruto, C. (2004). Fifty ways to leave your rubber: how men in Mombasa rationalise unsafe sex. *Sexually Transmitted Infections*, 80, 430-434.

Wilkins, A., Ricard, D., Todd, J., Whittle, H., Dias, F., & Paulo Da Silva, A. (1993). The epidemiology of HIV infection in a rural area of Guinea-Bissau. *AIDS*, 7, 1119-1122.

Wilson, D. (2004). Partner reduction and the prevention of HIV/AIDS: the most effective strategies come from within communities. *British Medical Journal*, 328, 848-849.

UNAIDS (2007). 07 AIDS Epidemic Update, World Health Organisation, Geneva, Switzerland. URL(http://data.unaids.org/pub/EPISlides/2007/2007_epiupdate_en.pdf) – last accessed 15 May 2009.

Full text version of

S A H A R A **J**

Available online at

www.sahara.org.za