Sexual behaviour and condom use among university students in Madagascar

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Abstract

Although the number of known HIV-infected students in Madagascar increased significantly between 1989 and 1995, very little is known about student behaviour with regard to AIDS. The study objectives were: to describe Malagasy students' sexual behaviour and condom use; to document students' perceptions about condoms; and to study the relationships between students' socio-demographic characteristics, their perceptions about condoms, and their condom use. The survey used a cross-sectional design and was conducted at the Antananarivo's university campus sites. Anonymous questionnaires were self-administered to 320 randomly selected students. Descriptive statistics and 95% confidence intervals were calculated. Logistic regressions were performed to identify the predictors of condom use. Participants' average age was 24 years. Approximately 80% of the participants reported sexual experiences, and the average age at sexual debut was 19 years. Only 5.7% reported consistent condom use. Common reasons for non-use were steady relationships (75.6%), the perception that condoms were useful only during ovulation periods (8.7%), and the decrease of pleasure (6.4%). The predictors of condom use were male gender, and the perception that condoms were useful during ovulation periods. Risky sexual behaviours with regard to AIDS were prevalent in this community. An HIV prevention programme is recommended.

Keywords: *Sexual behaviour, condoms, HIV, students, Madagascar.*

Résumé

Bien que le nombre connu des étudiants malgaches infectés par le VIH ait largement augmenté entre 1989 et 1995, l'information sur le comportement des étudiants par rapport au SIDA est très limitée. Les objectifs de cette étude furent: 1) décrire le comportement sexuel des étudiants malgaches et l'utilisation du préservatif, 2) documenter les perceptions des étudiants envers les préservatifs, 3) examiner dans quelle mesure l'utilisation du préservatif par les étudiants varie en fonction de leurs caractéristiques sociodémographiques et leurs perceptions envers les préservatifs. Cette étude a été menée dans les sites du campus universitaire d'Antananarivo en utilisant un devis transversal. Un questionnaire anonyme a été auto-administré à 320 étudiants sélectionnés au hasard. Des statistiques descriptives et intervalles de confiance à 95% ont été calculés. La régression logistique a été utilisée pour identifier les déterminants de l'utilisation du préservatif. La moyenne d'âge des participants était de 24 ans. Environ 80% des répondants ont signalé avoir eu des rapports sexuels et l'âge moyen de premiers rapports était de 19 ans. Seulement 5,7% ont rapporté l'utilisation systématique du préservatif. Les raisons de non utilisation furent les suivantes : être dans une relation stable (75,6%), la perception que le préservatif est uniquement utile durant la période d'ovulation (8,7%) et la réduction du plaisir (6,4%). Le genre masculin et l'argument d'ovulation ont été identifiés comme prédicteurs d'utilisation de préservatifs. Les comportements sexuels à risque vis-à-vis du SIDA étaient prédominants dans cette communauté. Un programme de prévention du VIH est recommandé.

Mots clés: *Comportement sexuel, condom, VIH, étudiant, Madagascar.*

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Introduction

Madagascar is a country where trends in the human immunodeficiency virus (HIV) epidemic are frightening. From 2000 through 2003, HIV prevalence increased from 0.15% to 0.95% (Executive Secretariat/National AIDS Control Committee, 2006). Concurrently, a high prevalence of curable sexually transmitted infections (STIs) was recorded. For example, a genital discharge rate of 5.7% was reported in men (Directorate of Demography and Social Statistics, 2000) and the chlamydial infection rate was up by 11% in women (Harijaona, Morisset, Rasamindrakotroka & Ravaoarinoro, 2002). As STIs have been shown to facilitate HIV transmission (Chesson & Pinkerton, 2000), acquired immune deficiency syndrome (AIDS) remains a real threat for the population.

Studies conducted in 1989 and 1995 reported that students represented respectively 0% and 2% of the people living with HIV in Madagascar (National Laboratory of Reference on HIV/AIDS in Madagascar, 2001). On a national level, among the 15 to 24 year-old population, about 17% indicated at least one casual sexual encounter in the year prior to the survey, but only 1.3% reported condom use during their last casual sexual intercourse (Directorate of Demography and Social Statistics, 2000). Given the assumption that the majority of university students are between 17 and 24 years of age, we believed that their community might be vulnerable to HIV infection through sexual risk-taking.

Researchers have reported risky sexual behaviour in African youths. For example, Nigerian university students indicated an average of 3.5 sexual partners at the time they were surveyed (Harding, Anadu, Gray, & Champeau, 1999). Approximately 63% of Togolese university students had more than one sexual partner at the time of the survey, and some 38% reported regular condom use (Sallah *et al.*, 1999). Among Malagasy women, more than one-third had premarital sex, but only 3% reported condom use during their last premarital sexual intercourse (Directorate of Demography and Social Statistics, 1997). None of these results can be transferred directly to the student population because of underlying socio-cultural and environmental diversities. In fact, changes in Malagasy sexual behaviour rates were observed amongst various cultures and regions (Directorate of Demography and Social Statistics, 2000).

Perceptions about condoms have been investigated in order to understand why people practise unprotected sex. The most frequently reported reasons for failure to use condoms were: trust in partners, wanting to have a child, loss of pleasure, and being involved in a monogamous relationship (Eaton, Flisher, & Aaro, 2003; Hawken *et al.*, 2002; Prince & Bernard, 1998).

This issue had not been extensively explored among Malagasy youth.

Although studies on links between condom use and socio-demographic characteristics have generated mixed results in different countries (Hawken *et al.*, 2002; Prince & Bernard, 1998), some have revealed an increase in use in younger age groups (Hawken *et al.*, 2002) and in men (Prince & Bernard, 1998; Nuwaha, Faxelid & Höjer, 1999). The socio-demographic determinants of condom use have not been studied in-depth in Madagascar, yet results from a national survey showed higher rates of condom use in the 20 to 24 year age range, and in men (Directorate of Demography and Social Statistics, 2000). Religion is a predominant social marker in Madagascar, but its relationship to sexual behaviour remains ambiguous.

As existing data did not provide public health authorities with an appropriate basis for decisions on the implementation of an HIV programme among Malagasy students, a survey of students' sexual behaviours was carried out on the seven campus sites of the University of Antananarivo, the largest university in Madagascar. Three goals were pursued: to describe male and female students' sexual behaviours and condom use; to document perceptions about condoms among students who do not use them consistently; and to study relationships between students' socio-demographic characteristics, their perceptions about condoms, and their condom use. We firstly hypothesised that reported risky sexual behaviour with regard to STIs/AIDS was prevalent among Antananarivo's university students; and secondly that age, gender and marital status were associated with condom use, but religion not.

Method

The study was approved by the Ethics Committee of Madagascar's National Laboratory of Reference on HIV/AIDS. It targeted 4 274 students registered at one of the seven campus sites of the University of Antananarivo: Ambohipo (site I), Vontovorona (site II), Ankatso 1 (site III), Ankatso 2 (site IV), Ambolonkandrina (site V), Ambatomaro (site VI) and 67 Hectares (site VII). The survey was conducted from February through July 2000, using a cross-sectional design. We expected that sexual behaviour prevalence would be between 5% and 95% in this student population. A sample size of 353 was therefore needed to allow for appropriate precision within 2.5% to 5%, considering a confidence level of 95%. The sample size was fixed at N=400 because of anticipated missing values.

Participants were selected using each site's list of registered students. As campus sites had different sizes, we used a stratified sampling scheme according to campus sites. Regardless of

socio-demographic characteristics, site-size equivalent sample fractions of 25.5%, 20.8%, 18.6%, 17.9%, 7.3%, 7.2% and 2.7% were extracted from all sites, which housed 1088 (site I), 890 (site II), 796 (site III), 795 (site IV), 310 (site V), 308 (site VI) and 117 (site VII) students. We expected a better representation of subjects residing in each site by using this procedure.

Data collection used a pre-tested anonymous questionnaire written in French, the university's teaching language. As recommended by the students during pre-tests, some terms were translated into Malagasy. Most of the relevant items were developed based upon a review of previous research, and the content was validated by three experts. Questions related to the variables of interest are presented in Appendix A. In the course of the analysis process, studied variables were reclassified to fit the local context. Socio-demographic variables included "age", "gender", "marital status" (Single/Married), and "religion" (Christian/non-Christian). Behavioural variables were "Sexual experience" (Yes/No), "Age at first sexual intercourse", "Sexual orientation" (Heterosexual/Homosexual/Bisexual), "Number of sexual partners in the past 12 months" (None/One/Two or more), "Commercial sex in the past 12 months" (Yes/No), "Vaginal sex in the past 12 months" (Yes/No), "Oral sex in the past 12 months" (Yes/No), "Anal sex in the past 12 months" (Yes/No), "Age at first vaginal sex", "Age at first oral sex", "Age at first anal sex", and "Condom use in the past 12 months": Never/Irregularly (sometimes or almost all the time)/Consistently (all the time).

As far as marital status was concerned, the few separated, divorced and widowed students were classified as single, and married students included legally married and cohabiting couples. For each respondent, the age at first sexual intercourse was defined as the one at which either vaginal, oral or anal sex was first experienced. Also, condom use in the past 12 months included using condoms during vaginal, oral and anal sex. Consistent condom use in the past 12 months implied condom use during all vaginal, oral or anal sexual intercourse. In the same way, it was established that a participant had never used a condom in the past 12 months when he or she reported never using one for all the types of sexual practices. The rest of the sexually active participants were considered to be irregular condom users.

In order to document students' perceptions about condoms, an open-ended question was asked: "why wouldn't you use a condom during sexual intercourse?" Then variables were extracted from the most common reasons for non-condom use and classified into two categories: mentioned/not mentioned.

The survey was carried out during the annual medical examination

visit each student must make to a university health clinic. Two workshops were held for local investigators to ensure uniform data collection. A trained investigator supplied one questionnaire to each selected participant in a private room. After informed oral consent was given, the questionnaire was self-administered by the student. One investigator was present to reply to the participant's queries. The completed form was immediately put into a large envelope and sealed. In the case of a participant's absence or refusal, the investigators documented the socio-demographic characteristics and reasons for non-participation.

Descriptive statistics and 95% confidence intervals (95%CI) were calculated. A significance level at 0.05 was considered for *p*-values. Means and percentages were weighted by campus site for socio-demographic characteristics, behavioural and perception variables. In order to compare percentages, the Pearson's $\chi2$ Test, or where necessary, the Fisher Exact Test were used. The Pearson's $\chi2$ Test was not calculated if at least one expected value was less than 1. For the mean comparison between sub-groups, an analysis of variance or, if needed, the appropriate nonparametric test was run. Logistic regressions were performed to evaluate the extent to which students' socio-demographic characteristics, and some of their perceptions about condoms, were associated with their condom use, the dependent variable. Independent variables, including "age", "gender", "marital status", "religion" and the collected common perceptions about condoms were introduced in the model. The number of sexual partners in the past 12 months was entered as a potential confounder. Some potential effect modifiers were also inserted. When assessing interaction effects, a chunk likelihood ratio test was found to be statistically non-significant, so all the entered product terms were eliminated. Confounding effect was confirmed if the computed odds ratio (OR) changed by at least 10% when removing the factor. The number of sexual partners in the past 12 months was found to be a confounder and was then maintained in the reduced model. Analyses used Epi6 6.04 and SPSS 10.0 software packages.

Results

Participation rates and socio-demographic characteristics

Most of the selected students participated in the survey (320 out of 400 students). The participation rates were respectively 82%, 86%, 76%, 75%, 79%, 79% and of 83% in the sites I to VII. Non-participants did not respond for many reasons: 24 (6%) moved; 16 (4%) lived off-campus; 14 (3.5%) were travelling; 14 (3.5%) had courses or exams; 2 (0.5%) were hospitalised; 1 (0.3%) disliked the research, 1 (0.3%) wanted to preserve his privacy, 3 (0.8%) had administration problems; and 5 (1.3%)

Table 1. Socio-demographic characteristics of the participants and non-participants, University of Antananarivo, Madagascar, 2000 (*N*=400)

| | Participants (*N*=320) | | Non-participants (*N*=80) | | |
	Number	(%)	Number	(%)	*p*
Age					
18-23 years	144	(45.7)	21	(29.3)	
24-29 years	142	(44.3)	43	(54.2)	0.016
≥30 years	32	(10.0)	12	(16.4)	
Gender					
Male	204	(60.6)	47	(55.8)	0.483
Female	116	(39.4)	32	(44.2)	
Marital status					
Single	275	(86.2)	60	(84.0)	0.085
Married	42	(13.8)	16	(16.0)	
Religion					
Christian	298	(94.4)	n.a.		-
Non-Christian	20	(5.6)	n.a.		

n.a.: data not available

students were not found, in spite of repeated contact attempts by the person responsible for the survey.

Table 1 shows the socio-demographic characteristics of the study participants. Their average age was 24 years (median=24; range=18-47). Men represented approximately two thirds of the study population. It was noticed that the average age differed significantly in the sites I to VII: 26, 22, 25, 24, 25, 24 and 27 years respectively (Kruskal-Wallis analysis of variance: *p*<0.001); as did the proportions of men, which were 65.9%, 80.3%, 50.9%, 53.6%, 73.9%, 59.1% and 40.0% respectively (*p*<0.01). The majority of students said they were single, and over 90% indicated they were Christians. Of those selected to be surveyed, participants were 2 years younger than non-participants: 24 v. 26 years (*p*<0.01).

Malagasy students' sexual behaviour and condom use

Approximately 80% of the participants reported sexual experiences. The indicated age at sexual debut was between 7 and 27 years for men (average=18.4 years; median=18 years) while it varied from 14 through 28 years for women (average=20.2 years; median=20 years). These distributions were significantly different among men and women (Wilcoxon test: *p*<0.001). Of all the sexually active participants, one student declared he was bisexual, and the rest said they were heterosexual.

Table 2 presents the sexually active respondents' sexual behaviour and condom use. During the year prior to the study, 29% of the students had two or more sexual partners, and 7.8% reported having commercial sex. Vaginal intercourse was reported by almost all the participants, while few students declared oral (14.8%) and anal sex practices (3%). While the

average age at sexual debut was 19 years for all the sexually active students, it was 19, 21 and 20 years for vaginal, oral and anal sex respectively. Systematic condom use was reported by 5.7% of respondents.

Men were statistically different from women regarding a number of behaviours. While almost one-third of the male students reported two or more sexual partners, only about 1 out of 10 of the female students reported this (*p*<0.001). Moreover, none of the women reported having commercial sex, while 13% of the men did (*p*<0.001). Lastly, about half of the women had never used a condom in the past 12 months. This rate was estimated at nearly one-third for the men (*p*=0.016).

Students' perceptions about condoms

Table 3 reports students' common perceptions about condoms. Approximately 94% of the respondents had not used condoms consistently in the past 12 months. Almost all of the latter (215/217) could state at least one reason for not using condoms. The most frequently reported reasons were: sexual intercourse with a steady partner (75.6%); sex during off-ovulation periods (8.7%); and decrease of sexual pleasure (6.4%). Some students mentioned other less common reasons like: trust in the partner (2.8%); feeling uncomfortable when using condoms, including breakages (3.1%); lack of knowledge on how to use a condom (3.8%); unaffordable costs of condoms (1.8%). Infrequently (less than 1% for each variable), students indicated the following reasons: the fear that condoms were contaminated with HIV or other pathogens, the fear that condoms generated side-effects, partner refusal, immediate unavailability of condoms, intention to procreate, safety with a HIV-seronegative partner, spontaneity

Table 2. Malagasy students' reported sexual behaviour and condom use in the past 12 months, University of Antananarivo, Madagascar, 2000, ($N\approx262$)

	Men ($N\approx166$)			Women ($N\approx96$)			
	N	%	(95%CI)	N	%	(95%CI)	P
Number of sexual partners in the past 12 months	N_{total}=163			N_{total}=95			
None	11	9.0	(6.3 - 11.6)	12	13.7	(9.8 - 17.6)	
One	87	51.3	(46.7 - 56.0)	69	73.3	(68.3 - 78.3)	
Two or more	65	39.7	(35.1 - 44.2)	14	13.0	(9.2 - 16.8)	<0.001
Commercial sex in the past 12 months	N_{total}=154			N_{total}=83			
Yes	19	12.7	(9.5 - 15.9)	0	0.0	n/a	<0.001
Vaginal sex in the past 12 months	N_{total}=155			N_{total}=84			
Yes	154	99.3	n/a	83	98.9	n/a	1.000*
Oral sex in the past 12 months	N_{total}=154			N_{total}=81			
Yes	28	20.0	(12.1 - 24.3)	7	6.3	(2.5 - 14.8)	0.051
Anal sex in the past 12 months	N_{total}=153			N_{total}=82			
Yes	3	1.7	n/a	4	5.1	n/a	0.242*
Condom use in the past 12 months	N_{total}=154			N_{total}=83			
Never	48	36.6	(31.9 - 41.2)	39	46.2	(40.1 - 52.2)	
Irregularly	98	57.6	(52.8 - 62.3)	39	46.2	(40.1 - 52.2)	0.042
Consistently	8	5.9	(3.6 - 8.1)	5	7.6	(0.9 - 11.1)	

n/a: not applicable, 95%CI not calculated
* Fisher Exact Test

of sexual acts, embarrassment when purchasing condoms, absence of flux, the perception that condoms were unnatural, and inducements to temptation. A statistically significant difference was found when comparing men's perceptions with women's with regard to condoms. Female students were more likely to state that condoms were not useful with a steady partner: 86% v. 69% (p<0.03).

Relationships between students' socio-demographic characteristics, perceptions about condoms, and condom use

Table 4 presents computed odds ratios from multivariate analyses that compared condom use (used condom irregularly) and non-condom use (never used condom) among the studied population. The few students who used a condom on a regular basis were excluded. Most of them found no reason to engage in unprotected sexual intercourse, or did not answer the question related to perceptions about condoms. Results showed that the main predictors of condom use were male gender and the perception that condoms were useful only during women's ovulation periods (p<0.01). Males were twice as likely to report using condoms as females. Students who felt that condoms were useful only

during ovulation periods were six times more likely to use them, compared with students who didn't state such an opinion.

Discussion

The findings confirm the first hypothesis that reported risky sexual behaviour with regard to STIs/AIDS was prevalent among Antananarivo University students. Although late sexual debut was recorded, consistent condom use was very low. Results lead one to question whether those students had any sexual health education. Also, the fact that the students were away from their family and free from parental behavioural prohibitions, might have induced them to engage in hazardous sexual intercourse. Consequently, students were vulnerable and there was a risk of HIV infection spread in their community.

The results support the hypothesis that gender is associated with condom use. In Madagascar, rates of using condoms were found to be lower among women than men (Directorate of Demography and Social Statistics, 2000). In the present study, female students were as likely as male students to say that they would not use condoms with a steady partner. A second study

Table 3. Common reasons for non-condom use among students who do not use them consistently, University of Antananarivo, Madagascar, 2000 (*N*≈215)

	Men (*N*=139)			Women (*N*=76)			*p*
	N	%	(95%CI)	N	%	(95%CI)	
"Condom is useful only during ovulation periods"							
Mentioned	10	5.4	(2.9 - 11.5)	10	14.1	(5.6 - 20.8)	0.150
"No condom with a steady partner"							
Mentioned	96	68.9	(61.4 - 76.7)	63	86.3	(74.4 - 91.4)	0.027
"Decrease of sexual pleasure"							
Mentioned	13	8.8	(4.5 - 14.2)	4	2.6	n/a	0.288

n/a : not applicable, 95%CI not calculated

supported the finding that Malagasy women are unwilling to use condoms with their steady boyfriend (Behets *et al.*, 2005). This suggests that women engaged in unprotected sexual intercourse in steady relationships, and in this way, they were exposed to STIs and HIV infection. This indicates the need to specifically target female students in HIV prevention programmes. Furthermore, the observed gender and relationship differences with regard to condom use should be taken into consideration when defining condom promotion strategies. Messages tailored to men, women and couples are required.

The last hypothesis that religion is not associated with condom use was verified. This is in agreement with data obtained from research on Malagasy women (Glick, Randriamamonjy & Sahn, 2004). Christian affiliation is predominant in Antananarivo. Results may reflect firstly, the difficulties of integrating sexual education in Christian teachings; and secondly, the gap between Christian identity and individual behaviour with regard to

some of its doctrines. For example, condom use was recorded in spite of the Catholic position against condoms. Besides, none of the sexually active students had indicated religion as a reason for non condom use. In the Malagasy social context, Christian churches have shown considerable flexibility. Actually, religious and traditional practices cohabit without competition (Roubaud, 1999). Our data revealed that although the majority of respondents considered themselves Christians, premarital sexual intercourse was quite common. Malagasy students' sexual behaviour, including condom use, may have been determined by both the existence of sexual health education and the conservation of traditional cultures allowing sexual activities before marriage (Garenne & Zwang, 2004). Data also suggest that instead of religious affiliation or identity, faith-based religiosity could be a measure of interest in the study of relationships between religion and sexual behaviours in Madagascar.

Table 4. Relationships of students' socio-demographic characteristics and perceptions about condoms, to their condom use, University of Antananarivo, Madagascar, 2000 (*N*=209)

	OR	(95%CI)	*p**
Socio-demographic characteristics			
Age†	0.87	(0.54 - 1.38)	0.272
Gender	2.29	(1.19 - 4.42)	0.007
Marital status	1.68	(0.78 - 3.61)	0.094
Religion	1.43	(0.41 - 4.95)	0.188
Common perceptions about condoms			
"Condom is useful only during ovulation periods"	6.04	(1.53 - 23.83)	0.005
"No condom with a steady partner"	1.57	(0.69 - 3.55)	0.141
"Decrease of sexual pleasure"	0.86	(0.25 - 2.88)	0.400

* One-tailed p-value from Wald Test
† "Age" was classified into 3 categories: 18-23 years / 24-29 years / ≥30 years

However, findings do not support the hypotheses that age and marital status are associated with condom use. The participants' homogenous educational level, university context, and gender relationships might explain the discrepancy. In fact, two larger studies conducted in Madagascar, in 2000 and 2004, reported significant associations of higher educational attainment with increase in condom use (Directorate of Demography and Social Statistics, 2000; Glick, *et al.*, 2004). Since studies were students' first concern, becoming pregnant before graduating was undesirable for the majority, and the use of condoms to prevent conception interested both single and married students. Men and women in Madagascar have a more egalitarian relationship than couples in many other African countries (Gastineau, 2005). This probably allows for couples' shared decision to use condoms.

On the one hand, some of the results were not surprising on account of their consistency with available data. For example, the earlier age at sexual debut (Eaton *et al.*, 2003) and the larger number of sexual partners indicated by men than women were consistent with results from other African countries (Hawken *et al.*, 2002). Some reasons for not using condoms among Malagasy students were similar to those mentioned by Kenyans and Nigerians (Anugwom, 1999; Hawken *et al.*, 2002).

On the other hand, some observations differed from other findings. For example, Malagasy students reported a later age at sexual debut (19 years old) compared with South Africans, where more than 50% were already sexually active at the age of 16 (Eaton *et al.*, 2003). At the same time, the median age at sexual debut was 16-17 years among the Malagasy general population (Directorate of Demography and Social Statistics, 2000). Again, the Malagasy students were motivated to postpone their fecund life because of schooling and studies at the university. Furthermore, it is possible that some Malagasy students did not want to engage in premarital sexual activity because of religious convictions. Studies reported the association between religion and sexual initiation (McCree, Wingood, DiClemente, Davies & Harrington, 2003). Lastly, the average age at first intercourse could have been biased because of understatements.

Malagasy students indicated low systematic condom use: 5.7%, which was not much different from the 8% reported condom use among South African students (Eaton *et al.*, 2003). It is a major concern to note that Malagasy students had a low risk perception of contracting AIDS. Only one student stated that he would not use a condom with an HIV seronegative partner (0.5%). Among Nigerian students, 50% would use condoms to prevent STIs/AIDS (Anugwom, 1999). The important difference between Malagasy and Nigerians' data might be accounted for by the fact that the survey among Nigerians happened during a local HIV campaign. The low risk perception of contracting AIDS in this Malagasy student community needs to be explored by conducting in-depth studies when implementing any HIV programme.

In the present study, condom users were male rather than female. Among Turkish and Nigerian students, condom users were women rather than men (Gokengin *et al.*, 2003; Olley & Rotimi, 2003). Differences in perceived social norms about condoms between the populations might explain the discrepancy. Furthermore, the use of another contraceptive method could have led Malagasy women to abandon the use of condoms. Nevertheless, results indicate that some female students were vulnerable to HIV, particularly, those who never used condoms with a steady partner.

The study was important on two counts. It was the first carried out in this population group and met the local public Health Department's need to document the risk of HIV spreading in the university student community. Most of the variables were studied in other research projects, and the content validity was checked by experts. Nonetheless, only sexual behaviour in the past 12 months was investigated, and the questions did not include the number of lifetime sexual partners. Thus, the HIV transmission risk might have been underestimated.

The presence of investigators during the questionnaire administration provided the opportunity to get a response to each question, but could have caused information bias. The under-reporting of socially undesirable sexual behaviour, like having a high number of sexual partners, was expected, as well as the overestimation of desirable behaviour like using condoms. As far as the data collection method is concerned, proceeding with an anonymous postal questionnaire might have reduced such information bias. Weaknesses were also found in some interval estimates which could not be calculated, or were too wide. A larger sample would have given more precise point estimates.

Lastly, findings justify the implementation of an HIV prevention programme in this Malagasy student community. The noted gender behavioural differences suggest the adoption of individual focused strategies such as counselling that are tailored to each person's needs. Although current data are useful for an immediate local HIV intervention, or for further youth sexual health research, they need to be complemented by long - term HIV projects among students.

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