

Original
article

Characteristics associated with prevalent HIV infection among a cohort of sex workers in Cameroon

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Objective: To determine prevalence of HIV infection in a cohort of female sex workers in Cameroon, and to describe characteristics associated with HIV infection in this population.

Methods: In a cross sectional study, 2260 female sex workers in Cameroon were interviewed and screened for HIV serostatus. A standardised questionnaire was used to collect information on sociodemographic characteristics and sexual and health behaviours.

Results: Seropositive participants (18%) were more likely to be over age 25, have four or more children, live in Yaoundé or Douala for 5 years or less, solicit clients in their homes or on the street, have a low educational level, earn a weekly income of less than \$24, and have no other occupation outside of sex work. A logistic regression model of selected sociodemographic characteristics indicated that women at particularly high odds of HIV infection were older, poorer, and new immigrants to their city of residence.

Conclusion: This seroprevalence study found a lower HIV prevalence than had been previously reported. Although our results are different, this group is still at much higher risk of HIV infection than the population as a whole.

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Keywords: HIV seroprevalence; sex workers; cross sectional study; Cameroon

Introduction

Globally, the HIV/AIDS pandemic continues to sweep across continents with the estimated number of adult HIV infections at 27.9 million by mid-1996. Approximately 90% of these infections have occurred in developing countries, the majority of which are transmitted through unprotected sexual intercourse. Sub-Saharan Africa accounts for approximately 60% of the world's total number of infections, and for almost 90% of the current 13.1 million HIV infections in adults and adolescents in Africa.¹ In 1987, the estimated HIV seroprevalence within the adult population in Cameroon was 0.5%. By 1993, the AIDS control unit of the Ministry of Health (MOH) had estimated that seroprevalence had increased to 3% with some regions already at or beyond 7%, and that differences between urban and rural prevalences were narrowing.²

Although HIV prevalence has remained relatively low in the adult population during the 1990s, a high prevalence of HIV has been detected in Cameroonian sex workers. A seroprevalence study in 1990 found an 8.6% seroprevalence among sex workers in Yaoundé.³ A subsequent serosurvey in 1992 in Yaoundé and Douala found an HIV prevalence of 25% and 45%, respectively, indicating a dramatic increase in HIV infection in this group.² The most recent HIV study conducted in 1994 among a random sample of sex workers (n=360) from Yaoundé revealed a 21% prevalence of HIV still indicating a high prevalence of infection in this population.⁴

We conducted a randomised controlled trial in Cameroon to measure the effect of nonoxynol-9 (N-9) vaginal film on HIV

incidence in sex workers. To be eligible to participate in this prospective study, women were first asked to participate in a screening study. We report here results from the cross sectional analysis of the screening population and examine the association of prevalent HIV infection with sociodemographic characteristics, sexual behaviours, health practices, and other behaviours among Cameroonian sex workers. More detailed cross sectional data specific to condom use and number of sex partners are being published elsewhere.⁵ This information was collected separately from the screening data reported here.

Methods

RECRUITMENT AND COUNSELLING

Outreach workers (who were also sex workers) briefly explained the screening study to sex workers in the community and referred those who met minimum study inclusion criteria to one of three clinics. To be in this study, women were required to be residents of Yaoundé or Douala of between 18 and 45 years of age, to have at least four different sex partners per month, to agree to be interviewed about their sexual behaviour, not be pregnant or desire pregnancy for the next year, or have allergies to condoms or spermicides.

This study used a family planning clinic, an STD clinic, and a community clinic, all of which were easily accessible to participants. Volunteers participating in the screening study were given individual pretest counselling which included information about the screening study, HIV and STD counselling, and correct condom use. After counselling and consent, women were referred to an interviewer.

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INTERVIEW AND HIV TESTING

Each woman was interviewed using a standardised questionnaire to collect data on socio-demographic characteristics and sexual and other health behaviours potentially associated with HIV infection. Upon completion of the interview, blood samples were taken from each participant by a study nurse or laboratory technician. Specimens were sent to a central laboratory at the Centre Hôpital Universitaire for Enzygnost HIV1/2 (Behring, Germany). All reactive samples were confirmed by western blot Novapath HIV-1 (Munich, Germany) for HIV-1 group M and Newlav blot II (Sanofi Diagnostic Pasteur, Marnes-la-Côquette, France) for HIV-2. MVP5180 western blot (Munich, Germany) and V3 loop ELISA (Behring, Germany) were used to confirm HIV-1 group O in suspected cases. Completed questionnaires were sent to a central processing centre in Yaoundé where they were verified, coded, queried, and entered using EPI-INFO. Data were sent to Family Health International in Durham, North Carolina, where they were converted into SAS data sets for analysis.

STATISTICAL METHODS

We used prevalence odds ratios (POR) for seropositivity and 95% confidence intervals to summarise our data. POR are appropriate for this study because this is a dynamic population, risk periods are not equal, and women are at extended risk for HIV.⁶ A multivariable logistic regression analysis was performed to identify characteristics independently associated with prevalent HIV seropositivity. The variables included in the logistic regression were significant in the univariate analysis ($p < 0.05$).

While most seroprevalence studies can only estimate prevalence measured at the time of serum collection, we were able to adjust the prevalence in this study by counting those seroconversions that were detected at enrolment into the clinical trial (1 month after the initial screening). These women were likely to

have already been infected with HIV but had not yet seroconverted at the time of screening; however, this adjusted prevalence cannot take into account those women who did not return to the clinic for their test results.

Results

GENERAL CHARACTERISTICS OF THE STUDY

POPULATION

Between February 1995 and January 1996, 2260 sex workers in Yaoundé and Douala were screened for HIV. A total of 393 (17.4%) were positive for HIV infection at screening. Of the 393 seropositives, 376 (96%) were positive for HIV-1, one (0.03%) was positive for HIV-2, and 16 (4.1%) were positive for HIV-1 group O. An additional 15 women were found to be seropositive at enrolment into the clinical trial (1 month after screening) bringing the total number of seropositives to 408 and the overall seroprevalence to 18.1%. Of the women who were screened for HIV infection, 613 (27%) who were HIV negative did not return for their results, and we consequently do not know what their serostatus would have been at enrolment into the clinical trial.

The mean age of participants in the screening study was 25.5 years. More than half (54%) reported a middle school education and nearly all (98%) could read. Their mean number of children was 1.2 with 55% reporting between one and three children. At the time of screening, 86% were not using any contraceptive method. The majority (97%) were not married. Almost three quarters of women reported sex work as their only occupation with a mean weekly income of US\$24. The mean duration of sex work was 4 years. More than one third (36%) of the women screened had been living in either Yaoundé or Douala all their lives, while an almost equal number (31%) had been in their city of residence for 5 years or less.

While virtually all (99.7%) participants had heard of a condom and 92% had previously used them, most (91%) had never used spermicides. More than half the women (55%) reported not using a condom at their last sexual episode with a client. Contraceptive use was reported by 14% of the participants; 5% were oral contraceptive users, while 9% reported other methods such as injectables, IUDs, sterilisation, spermicidal inserts, condoms, implants, and indigenous products inserted into the vagina.

SOCIODEMOGRAPHIC CHARACTERISTICS AND HIV SEROPOSITIVITY

HIV odds increased with age with women age 26 or older at highest odds of HIV seropositivity (table 1). Women with no or low education were more likely to be infected than women with moderate levels of education. The longer a woman lived in Yaoundé or Douala, the lower her odds of HIV infection; conversely those who were relatively new to either city were more likely to be HIV infected. HIV odds also increased with the number of children reported. Place of solicitation was associated with HIV infection, with women soliciting clients

Table 1 Sociodemographic characteristics and their association with HIV seropositivity as measured by prevalence odds ratios (POR) Cameroon, 1996 (n=2260)

Variable	Categories	No seropositive/ category (%)	POR (95% CI)
Age	18-20	55/466 (12)	1.0
	21-25	142/853 (17)	1.5 (1.1, 2.1)
	26-30	97/429 (23)	2.2 (1.5, 3.1)
	30+	115/511 (23)	2.2 (1.5, 3.1)
Marital status	not married	388/2187 (18)	1.0
	married	21/71 (30)	2.0 (1.2, 3.2)
Education	high school	59/484 (12)	1.0
	middle school	203/1220 (17)	1.4 (1.1, 2.0)
	primary	136/481 (28)	2.8 (2.0, 3.9)
	none	8/30 (27)	2.6 (1.1, 6.0)
No of years in Yaounde or Douala	all of life	91/808 (11)	1.0
	>10 years	74/386 (19)	1.9 (1.3, 2.6)
	6-10 years	75/376 (20)	2.0 (1.4, 2.7)
	1-5 years	130/571 (23)	2.3 (1.7, 3.1)
	<1 year	40/120 (33)	3.9 (2.6, 6.0)
No of children	0	120/868 (14)	1.0
	1-3	250/1239 (20)	1.6 (1.2, 2.0)
	4+	39/152 (26)	2.2 (1.4, 3.2)
Weekly income (sex work)	>\$40.00	62/405 (15)	1.0
	\$11.00-\$39.00	214/1216 (18)	1.2 (0.9, 1.6)
	\$0-\$10.00	133/637 (21)	1.5 (1.0, 2.0)
No of years as sex worker	<1 year	43/254 (17)	1.0
	1-5 years	247/1437 (17)	1.0 (0.7, 1.5)
	6+ years	120/570 (21)	1.3 (0.9, 1.9)

from bars or the home at higher odds of infection. Those whose weekly income was less than average (US\$24) and had no other occupation outside of sex work were more likely to be infected. Duration of sex work was also associated with HIV infection with those women who had been sex workers for 6 years or more at higher HIV odds.

A logistic regression analysis revealed the sociodemographic characteristics most associated with increased HIV odds were: (1) age greater than 25 (POR 1.2, 95% CI 1.0, 1.5), (2) a weekly income of less than \$10 (POR 1.7, 95% CI 1.4, 2.1), and (3) being a recent arrival (<1 year) to the resident city (POR 2.6, 95% CI 1.8, 4.0). We assigned a "risk score" of 0 to 3, depending on the number of these characteristics a woman had; 0 meaning she had none, 3 meaning she had all three. Women with none of these characteristics were at lower odds of infection while those with one or more of these characteristics had higher HIV odds with each additional characteristic present.

SEXUAL BEHAVIOUR AND HIV

Inconsistent use of condoms and failing to use a condom with the most recent client or non-client were associated with HIV infection

(table 2). Women whose most recent partner was a new client were more likely to be infected than those reporting either a repeat client or non-client at their last sexual episode. The primary reason cited for not using a condom with the last client was partner objection reported by 26% of the women. Those not using a condom with their last non-client partner (69%) were at greater odds of HIV infection than those reporting condom use with all partners. Women who did use a condom (19%) with their last non-client partner were at significantly lower odds of HIV infection. The reference period for this last sexual episode with the non-client partner was also associated with HIV infection; the more recent the episode, the greater the odds of HIV. Overall, these women were more likely to use condoms with new clients than with repeat clients, and with any type of client than with non-clients.

The univariate analysis revealed no association between anal and oral sex practices and HIV infection. In fact, seroprevalence was lower among those who reported engaging in anal (14%) or oral (22%) sex. However, among women who reported always using condoms during vaginal sex (n=190), anal sex was associated with slightly higher HIV odds (POR 1.25, 95% CI 0.3, 4.2). Those who had none of the three sociodemographic factors associated with HIV infection and had ever practised anal sex were at much higher odds of HIV (POR 4.6, 95% CI 1.4, 14.3).

Table 2 Self reported sexual behaviour and prevalent HIV infection associations as measured by prevalence odds ratios (POR), Cameroon, 1996 (n=2260)

Variable	Category	No seropositive/category (%)	POR (95% CI)
Ever had oral sex	no	331/1760 (19)	1.0
	yes	77/497 (15)	0.8 (0.6, 1.0)
Ever had anal sex	no	359/1931 (19)	1.0
	yes	49/327 (15)	0.8 (0.6, 1.1)
Use condoms with men (clients and non-clients)	never	62/347 (18)	1.0
	sometimes	316/1706 (19)	1.0 (0.8, 1.4)
	always	26/190(14)	0.73 (0.4, 1.2)
Last type of partner	non-client	140/938 (15)	1.0
	previous client	67/376 (18)	1.2 (0.9, 1.7)
	new client	202/944 (21)	1.6 (1.2, 2.0)
Used condom with last non-client	no	293/1574 (19)	1.0
	yes	54/439 (12)	0.6 (0.5, 0.8)
Last sex with client	>1 month	11/88 (13)	1.0
	within 30 days	20/126 (16)	1.3 (0.6, 2.9)
	within 14 days	38/281 (14)	1.1 (0.5, 2.2)
	within 7 days	128/822 (16)	1.3 (0.7, 2.5)
	day before	70/373 (19)	1.6 (0.8, 3.2)
	yesterday	109/442 (25)	2.3 (1.2, 4.4)
	today	33/128 (26)	2.4 (1.2, 5.1)
Condom with last client	no	259/1230 (21)	1.0
	yes	150/1030 (15)	0.6 (0.5, 0.80)

Table 3 Health behaviours and STD history associations with HIV as measured by prevalence odds ratios (POR), Cameroon, 1996 (n=2260)

Variable	Category	No seropositive/category (%)	POR (95% CI)
Current use of antibiotics	no	370/2140 (17)	1.0
	yes	39/120 (33)	2.3 (1.6, 3.4)
Currently using contraception	no	348/1949 (18)	1.0
	yes	60/310 (19)	1.1 (0.8, 1.5)
Ever used spermicide	no	380/2066 (18)	1.0
	yes	29/194 (15)	0.8 (0.5, 1.2)
Vaginal douching	no	302/1713 (18)	1.0
	yes	107/547 (20)	1.1 (0.9, 1.5)
Inserts chemical substances into vagina	no	231/1281 (18)	1.0
	yes	178/978 (18)	1.0 (0.8, 1.3)
No of injections in past 30 days	no	346/2004 (17)	1.0
	yes	63/256 (25)	1.6 (1.2, 2.1)
STD in last 3 months	no	372/2066 (18)	1.0
	yes	37/194 (19)	1.1 (0.7, 1.6)
Ever had an STD	no	207/1285 (16)	1.0
	yes	166/790 (21)	1.4 (1.1, 1.7)

HEALTH BEHAVIOURS AND STD HISTORY ASSOCIATED WITH HIV INFECTION

Several reported health behaviours were associated with an increase in HIV odds (table 3). HIV odds were higher among those reporting antibiotic use at the time of screening. Number of injections in the 30 days before screening was also associated with HIV seropositivity. Only seven participants (0.3%) screened reported ever having blood transfusions. No association with HIV seropositivity was found among women who inserted chemical substances into their vaginas, or who had ever practised vaginal douching. Women reporting ever using spermicides were at slightly lower odds of HIV seropositivity than never users. No association existed between self reported STD in the past 3 months and HIV seropositivity; however, women who had ever had an STD were at slightly higher odds of HIV infection.

Discussion

Our cross sectional study revealed identifiable risk markers for HIV infection among sex workers in Cameroon. These include age more than 25, low educational level, recent arrival to the city, four or more children, soliciting clients in the home or on the street, earning less than \$10 per week, and having no other occupation outside of sex work. Consequently, this study suggests that women who are the most vulnerable (poor, needy, and least likely to have social support) are more apt to be HIV infected than their peers. These risk markers may point to certain behaviours which would increase a

woman's chance of contracting HIV such as riskier sex practices, partner selection, and condom use.

We do not know why women who were relatively new to Yaoundé or Douala were at higher risk of HIV. Young women from developing countries who migrate to urban areas are likely to be from poorer and larger rural families, were allowed to leave their villages to find a job to help meet family expenses that are increasing with the growth of a cash economy⁷ and, faced with unemployment, turned to sex work for their livelihood.

In this study, HIV infection was inversely associated with sex related income. This association prevailed even when controlling for number of partners. Women who were middle or high income earners had more partners, but were not more likely to be HIV infected. This could be due to client/partner selection with poorer women having less control over who they would have sex with and whether or not condoms were used.

We found a much higher percentage of women reporting anal and/or oral sex than previous studies conducted in Africa, which found these practices very rare.⁸⁻⁹ While anal sex is a strong risk factor for HIV infection among homosexual men¹⁰ and has been associated with HIV infection among women,¹¹ we found no association between this practice and HIV seropositivity. It was only among the subset of women with none of the sociodemographic markers associated with infection and who always use condoms for vaginal sex that anal sex was found to be associated with HIV.

HIV prevalence was higher among those women who used antibiotics regardless of the number of partners they reported. The association between current use of antibiotics and HIV may be attributed to an increase in health problems by seropositive women. These women may also have a higher incidence of symptomatic STD which may lead to more frequent use of antibiotics; however, our data did not show this.

As has been found previously, condom use was more likely with clients than with non-clients. The primary reason for not using a condom at the last act was partner objection.¹²⁻¹³ Those not using a condom with their last partner (client or non-client) were at greater odds of HIV infection; these women may be more likely to be never or occasional users of condoms. Seropositivity also increased if the type of partner reported at the last sexual episode was a new one. This study also found that women who used condoms consistently with clients but did not use them with non-clients were more likely to be infected than those who reported using condoms consistently with all partners.

In the present study, we found an 18% and 16% seroprevalence in Yaoundé and Douala, respectively, which is lower than the 25% and 45% prevalence previously reported by the Cameroonian Ministry of Health.¹⁴ One explanation for these differing results might be attributed to the sampling methods used. The MOH research team surveyed a small number

of known sex workers and collected blood for syphilis testing. HIV testing was done anonymously and unlinked. In our study, women from all areas of Yaoundé and Douala were eligible to participate and we essentially used subject referral sampling. Thus, the prevalence found here may reflect a more representative prevalence for this population. Additionally, the large size of this study population (n=2260) may have included more of the less active full time sex workers and more part time sex workers. This is evidenced by the number of women (60%) whose last act with a client was within the past week or longer. HIV prevalence among those women reporting a more recent sexual episode with a client was closer to the earlier data reported by the MOH.

One of the limitations of this study, compared with previous studies done in Cameroon, was that women tested for evidence of infection did not include those women outside the inclusion/exclusion criteria for the N-9 screening study.

Conclusion

We have provided current evidence of the association between certain characteristics and behaviours with HIV infection among sex workers in Cameroon.

These findings suggest the continued need for a comprehensive effort in Cameroon to provide HIV education targeted at high risk groups such as sex workers. While we have identified a number of risk markers for HIV seropositivity, this study is limited in that it can only identify associations. Our prospective study of N-9 in which these women are participating will provide additional information on the incidence of HIV infection in this population.

Informed consent was obtained from each participant and the study and the consent process was approved by the Protection of Human Subjects Committee at Family Health International and the Ethics Review Committee of the Ministry of Public Health, Cameroon. Funding for this study was provided in part by the United States Agency for International Development, the Mellon Foundation, and the National Institute of Allergy and Infectious Diseases (grant AI34714). The views expressed in this article do not necessarily reflect those of the funding agencies. Family Health International is an international non-profit organisation that conducts research and provides technical assistance in reproductive health, family planning, STD, and AIDS.

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Contributors: Kelly A Ryan was responsible for training the study staff, study monitoring, analysing the data, and writing the manuscript. Ronald E Roddy was responsible for designing and monitoring the study, training the study staff, data analysis, and reviewing the manuscript. Leopold Zekeng assisted with the protocol development and was responsible for ensuring proper conduct of the study. He also reviewed the manuscript. Sharon S Weir was responsible for the concept and carrying out of the modelling work and reviewed the manuscript. Ubaldo Tamoufé assisted with protocol development, coordination of the field work, and reviewed the manuscript.

- 1 The Status and Trends of the Global HIV/AIDS Pandemic. Satellite Symposium of the XI International Conference on AIDS, 5-6 July 1996, Vancouver, Canada.
- 2 Interview with Dr Roger Salla, La prevalence estimee dans la population a beaucoup augmentee, SIDALERTE No 37, October 1994.
- 3 Kaptué L, Zekeng L, Feldblum P, et al. HIV-2 infection among high risk groups in Yaounde, Cameroon. V International Conference; AIDS in Africa, Kinshasa, Zaire, 10-12 October 1990, Poster WPB3.
- 4 Zekeng L, Gurtler L, Afane Ze E, et al. Prevalence of HIV-1 subtype O infection in Cameroon: preliminary results. *AIDS* 1994;8:1626-8.

- 5 Weir SS, Roddy RE, Zekeng L, *et al.* Measuring condom use: asking 'do you or don't you' isn't enough. *AIDS Education and Prevention* (in press).
- 6 Kleinbaum DG, Kupper LL, Morgenstern H. *Epidemiologic research: principles and quantitative methods*. Belmont, California, 1982:173.
- 7 Young and older women migrate. *World Population Service Popline* 1996;18:1-2.
- 8 Smith GL, Smith KF. Lack of HIV infection and condom use in licensed prostitutes. *Lancet* 1986;ii:1392.
- 9 Van de Perre P, Clumeck N, Carael M, *et al.* Female prostitutes: a risk group for infection with human T-cell lymphotropic virus type III. *Lancet* 1985;ii:524-7.
- 10 Winkelstein W, Lyman DM, Padian NM, *et al.* Sexual practices and risk of infection by the human immunodeficiency virus: the San Francisco Men's Health Study. *JAMA* 1987; 257:321-5.
- 11 Padian N, Maquis L, Francis DP, *et al.* Male-to-female transmission of human immunodeficiency virus. *JAMA* 1987;258:788-90.
- 12 Nzila N, Laga M, Kivuvu M, *et al.* Evaluation of condom utilization and acceptability of spermicides among prostitutes in Kinshasa, Zaire. In: *Abstracts of the V International Conference on AIDS, Montreal, June 1989* (abstract WAP96).
- 13 Pareja R, Jimerson A, *et al.* Why sex workers think their clients don't use condoms. In: Bond LS, ed. *A portfolio of AIDS/STD behavioral interventions and research*. Washington, DC: Pan American Health Organization (PAHO), 1992:284-8.
- 14 Garcia-Calleja JM, Ngoumou P, Boupda A, *et al.* HIV seroprevalence study among CSW in Yaounde and Douala. Yaounde: AIDS Control Unit, Ministry of Health, September 1992.