

ORIGINAL RESEARCH ARTICLE

Risk factors for HIV infection among women in Carletonville, South Africa: migration, demography and sexually transmitted diseases

K Zuma MSc^{1,2}, **E Gouws** MSc¹, **B Williams** PhD³ and **M Lurie** PhD^{4,5}

¹*Biostatistics Unit, Medical Research Council, Durban, South Africa;* ²*Department of Statistics, University of Waikato, Hamilton, New Zealand;* ³*Council for Scientific and Industrial Research, Johannesburg, South Africa;* ⁴*HIV Prevention Research Unit, Medical Research Council, Durban, South Africa;* ⁵*Brown University, School of Medicine, Providence RI, USA*

Summary: We investigate the prevalence of, and risk factors for, HIV infection among women in an urban South African setting. A random sample of 834 women was recruited into a community-based cross-sectional study. HIV prevalence was 37.1% with higher prevalence among migrant women (46.0%) than non-migrant women (34.7%), (odds ratio [OR]=1.61, 95% confidence interval [CI]: 1.11–2.31). The highest HIV prevalence (50.9%) was between ages 26 and 35 years. Having two or more lifetime partners increased the risk of HIV infection (OR=4.88, 95% CI: 3.01–7.89). Migration, age, marital status, alcohol use, syphilis and gonorrhoea were independently associated with HIV infection. Migration increases the risk of HIV infection. Provision of services to treat sexually transmitted diseases and educational empowerment programmes that will promote safer sex among migrant women are urgently needed.

Keywords: HIV, migration, women, sexual behaviour, South Africa

Introduction

The association between HIV, other sexually transmitted diseases (STDs), and migration of people, both between^{1–3} and within^{4–7} countries, has been described in a number of studies and reviews. Mobility is associated with increased levels of risky sexual behaviour and hence with HIV infection⁷. Circular migration between rural and urban areas, whereby migrants maintain close links with their rural homes to which they return occasionally, is common in South Africa. Circular migration is known to increase the risk of HIV infection among women whose partners are migrants⁸. The impact of the return of migrants on their partners has also been documented in a study carried out in Senegal, which showed higher HIV prevalence among men who had worked in another African country and among their rural sexual partners compared with men and women who had never travelled to another African country⁹.

In recent years, female circular migration has increased in South Africa. The impact that migration has on the health of female migrants has not been investigated as extensively as it has been for

men and most studies have concentrated on the migration of men and the risk that this entails for them and their non-migrant female partners^{5–9}. The study by Brewer *et al* is among a few that reports on the risk factors for HIV infection among migrant women¹⁰. In this paper, we investigate risk factors for HIV infection in self-identified migrant and non-migrant women in Carletonville, South Africa but we concentrate on women who do not consider themselves to be sex-workers. A detailed account of sex-workers in the area has been reported elsewhere¹¹. The study was part of a cross-sectional survey carried out in the area to investigate the prevalence of HIV and other STDs.

Material and methods

Population and sampling methods

In August 1998 a cross-sectional study conducted in Khutsong, a township in the Carletonville district of South Africa, collected data from men and women aged 13 to 60 years¹². Index houses were selected using a two-stage random sampling technique based on maps of the area. Starting from an index house a systematic sample of households was taken to give a self-weighted sample. Everyone who slept in the household the night before the study team visited was eligible for inclusion. A maximum of three visits were made if eligible

Correspondence to: Khangelani Zuma, Department of Statistics, University of Waikato, Private bag X3105, Hamilton, New Zealand
E-mail: kz2@stats.waikato.ac.nz

participants were not at home. Women from the nearby informal settlement, locally known as 'hotspots' where women sell alcohol and sex to mineworkers, were recruited to complement the qualitative in depth studies that were planned as part of the project¹¹. The refusal rate was less than 10%.

Questionnaire and biological tests

A UNAIDS questionnaire¹³ was pilot tested and then adapted to meet local situations. A signed consent form was obtained. Interviewers administered a detailed questionnaire that collected information on background and sexual behavioural characteristics. Two tubes of venous blood and approximately 10 mL of first stream urine were obtained for serological tests of HIV, syphilis,

gonorrhoea and chlamydia and have been presented elsewhere¹⁴. A single Capillus HIV-1/HIV-2 latex aggregation test (Cambridge Biotech Corporation, Galway, Ireland) was used to screen the sera for HIV infection. Participants were offered free treatment for detected STDs. A separate enzyme-linked immunosorbent assay was done with pre- and post-test counselling arranged for those who wished to know their HIV-status.

Data management and statistical analysis

Data were double entered into a database (Microsoft Access, Redmond, USA). SAS version 6.12 (SAS Institute, Cary, NC, USA) was used for statistical analysis. Variables that were significant ($P < 0.05$) in the univariate analysis, based on the likelihood ratio test, were included in the

Table 1. Univariate analysis of possible risk factors for HIV

Variable	Total	HIV prevalence (%)	OR (95% CI)	* <i>p</i> value
Migration status				
Migrant	150	46.0	1.61 (1.11–2.31)	0.011
Non-migrant	551	34.7	1	
Length of stay (if travelled outside)				
One month or less	248	36.3	0.39 (0.20–0.76)	0.004
More than one month	42	59.5	1	
Age (in years)				
13–25	263	35.7	1.69 (1.13–2.50)	0.010
26–35	222	50.9	3.15 (2.10–4.73)	0.001
36+	214	24.8	1	
Marital status				
Single	113	21.2	0.39 (0.24–0.64)	0.001
Divorced/widowed	61	36.1	0.83 (0.48–1.43)	0.493
Married/committed	527	40.6	1	
Educational level				
No education or primary	530	36.8	0.97 (0.67–1.31)	0.856
Secondary or higher	165	37.6	1	
Drank alcohol in the last four weeks				
At least once a day	70	48.6	1.92 (1.57–3.19)	0.011
Less than once a day	171	43.9	1.59 (1.11–2.78)	0.011
Never	458	33.0	1	
Employment status				
Student	138	16.7	0.27 (0.16–0.45)	0.001
Employed	234	41.6	0.96 (0.68–1.35)	0.803
Unemployed	327	42.5	1	
Number of lifetime partners				
Two partners or more	542	43.9	4.88 (3.01–7.89)	0.001
Fewer than two partners	159	13.8	1	
Sexual contact other than regular partner				
Yes	156	48.7	1.60 (1.11–2.30)	0.011
No	486	37.2	1	
Syphilis				
Positive	69	55.1	2.27 (1.34–3.75)	0.001
Negative	630	35.1	1	
Gonorrhoea				
Positive	46	60.9	2.84 (1.54–5.25)	0.001
Negative	650	35.4	1	
Vaginal discharge				
Yes	287	47.0	2.05 (1.50–2.81)	0.001
No	414	30.2	1	

OR=odds ratio; 95% CI=95% confidence interval; *= χ^2 *P* value

multivariate logistic regression model. The 95% confidence intervals (CIs) are reported. The ethics committee of the University of the Witwatersrand provided ethical approval.

Results

Out of 834 women recruited into the study, 711 (85.3%) were from Khutsong township. Only 709 women stated their migration status of whom 150 (21.2%) were migrants and 559 (78.8%) were non-migrants. Women were born in other urban areas of South Africa (33.1%), Carletonville district (32%), rural areas of South Africa (26.8%) and other countries (8.1%). Forty-eight percent of migrant women were born in other rural areas of South Africa.

Migrant women were significantly older (mean=34.4 years, SD=8.9) than non-migrant women (mean=28.7, SD=10.8), $P < 0.001$. A larger proportion (95%) of migrant women were either married or committed compared to non-migrant women (81%). Migrant women were significantly more likely to have two or more lifetime partners compared with non-migrant women (odds ratio [OR]=4.18, 95% CI: 2.25–7.76, $P=0.001$). Migrant women were more likely than non-migrant women to report having had sexual contact with a person other than a regular partner in the last year (OR=2.38, 95% CI: 1.60–3.54). Age at first sexual intercourse was not associated with migration status. The use of condoms, although generally low (22%), was significantly higher among non-migrant women than among migrant women (OR=1.88, 95% CI: 1.02–3.45).

Table 1 presents a univariate analysis of possible risk factors for HIV infection. Migrant women are at higher risk of HIV infection than non-migrant women (46.0% vs 34.7%, $P=0.011$). Among those who travelled out of the area, the prevalence of HIV was significantly lower among those who stayed away for less than a month as compared with those who stayed away for more than a month. Women aged 35 years or younger and married or committed women were at greater risk of HIV infection than those who were older or single. Level of education was not associated with HIV infection. Students or scholars were significantly less likely to be infected with HIV than those who were unemployed.

The prevalence of HIV, gonorrhoea, syphilis and current genital ulcers was 37.1%, 9.8%, 7.0% and 4.6%, respectively. Median (inter-quartile range) number of lifetime partners was three (2–5). Age at first sexual intercourse, contraceptive use, condom use and presence of genital ulcers were not associated with HIV infection. Having two or more lifetime partners incurred a five-fold increase in the HIV infection, Table 1. Sexual contact with a person other than a regular sexual partner in the last year was associated with an increased risk of HIV

Table 2. Multivariate analysis of independent risk factors for HIV infection

Variable	OR (95% CI)	P value*
Migration status		
Migrant woman	1.52 (1.01–2.28)	0.046
Non-migrant woman	1	
Age categories (years)		
12–25	2.61 (1.59–4.28)	<0.001
26–35	3.54 (2.26–5.56)	
36+	1	
Marital status		
Single	0.47 (0.28–0.81)	0.008
Divorced/widowed	1.35 (0.76–2.42)	
Married/committed	1	
Alcohol use in last four weeks		
At least once a day	1.88 (1.07–3.33)	0.016
Less than once a day	1.58 (1.05–2.38)	
Never	1	
Syphilis		
Positive	1.86 (1.06–3.23)	0.024
Negative	1	
Gonorrhoea		
Positive	2.43 (1.27–4.66)	0.007
Negative	1	

OR=odds ratio; CI=confidence interval; * χ^2 P values based on the likelihood ratio test

infection. STDs associated with HIV infection were syphilis, gonorrhoea and having had vaginal discharge in the last 12 months.

The multivariate logistic model is given in Table 2. Being a migrant, younger, married, drinking alcohol, having syphilis and gonorrhoea were all significant predictors of HIV infection. The effect of some variables was slightly reduced when adjusting for other variables in the model. But the direction of the effect did not change. The number of lifetime partners was significant in the univariate analysis but not in the multivariate analysis.

Conclusions

The results show that migrant women are at significantly higher risk of HIV infection than non-migrant women so that circular migration increases the risk of HIV infection for women as it does for men^{5–7}. HIV infection was higher among migrant women whether they were married or single, suggesting that whilst migrant women are away from home they engage in sexual activities with multiple partners, possibly as a strategy for economic survival during their migration period. Condom use was lower among migrant women than non-migrant women indicating that factors that make commercial sex workers vulnerable to HIV, such as the reluctance of their clients to use condoms, may extend to other women also¹¹.

Risk factors such as a large number of lifetime partners and extramarital relationships, which are known to increase the risk of HIV infection, were more common among migrant women¹⁰. Our results show an unadjusted five-fold increase in

HIV infection associated with having more than one lifetime partner compared with unadjusted 3.3-fold increase among women in the sugar cane plantations of the Dominican Republic¹⁰. Female circular migration, like that of men, probably contributes significantly to the transmission of HIV and other STDs transmission⁷. Controlling for migration status, women aged 35 years or younger were more likely to use a condom sometimes (OR=3.16; 95% CI: 1.61–6.21), although this does not provide full protection against HIV/STDs infection.

A large proportion of women between 26 and 35 years, the age group with the highest prevalence, were migrants. Analysing data in 10-year age bands (data not shown) to investigate possible changes in HIV prevalence ratio (PR) between migrants and non-migrants, the PR was consistently higher among migrants as compared with non-migrants. This indicates that though age is an important determinant of HIV infection, migration of women is also a crucial social factor in the spread of HIV in all age groups. STDs play an important role in the spread of HIV¹⁵. In this study, HIV infection was high among women who had syphilis, gonorrhoea and experienced a discharge in the last year but the association between HIV and STDs is confounded by sexual behaviour¹⁶.

In the multivariate model migration status was a consistent risk factor for HIV infection even after adjusting for other (demographic and STDs) risk factors including alcohol use. The question concerning alcohol use was not a sensitive marker of the risk of HIV infection since it referred to the use of alcohol in the previous four weeks but it is an indicator of long-term risk behaviour, which has been associated with increased risk of HIV¹⁰.

The prevalence of HIV and curable STDs are alarmingly high and emphasize the urgent need for interventions aimed at combating the spread of HIV and STDs among women in general and migrant women in particular. Such interventions should address social and economic factors promoting the spread of HIV. Population based strategies for treating STDs, which have been shown to reduce HIV incidence¹⁷, are essential. The nature of existing urban–rural migration in South Africa and other developing countries requires an integrated approach of ongoing interventions at both ends of the migration spectrum⁷. Interventions, such as those described by Williams *et al.*¹⁴ should cover not only the migration destinations but also the rural areas and other places from where migrants come.

Migration is a significant risk factor for HIV infection among women. Being young or having an STD increases the risk of HIV infection irrespective of migration status. There is an urgent need for provision of services to treat STDs and for educational and empowerment programmes that will promote condom use among migrant women. In the longer term, steps must be taken to address

the social and economic pressures that migrant women face.

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