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THE SOUTHERN AFRICAN MIGRATION PROJECT

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MIGRATION, SEXUALITY AND  
THE SPREAD OF HIV/AIDS  
IN RURAL SOUTH AFRICA

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MIGRATION POLICY SERIES No. 31

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MIGRATION, SEXUALITY  
AND THE SPREAD OF  
HIV/AIDS IN  
RURAL SOUTH AFRICA

MARK N. LURIE

SERIES EDITOR:  
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SOUTHERN AFRICAN MIGRATION PROJECT  
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## EXECUTIVE SUMMARY

South Africa is experiencing one of the fastest growing HIV epidemics in the world. Among women attending antenatal clinics nation-wide, the prevalence of HIV infection increased from 0.76 per cent in 1990 to 26.5 per cent in 2002. Among the nine South African provinces, KwaZulu/Natal has consistently had the highest antenatal HIV prevalence: 36.2 per cent in 2000. The epidemic is by no means limited to urban areas. As in the rest of Sub-Saharan Africa, the predominant mode of urban and rural transmission is heterosexual intercourse.

Migration is one of many social factors that have contributed to the AIDS pandemic. Previous studies have shown that people who are more mobile, or who have recently changed residence, tend to be at higher risk of HIV infection than people in more stable living arrangements. In Uganda, for example, people who have moved within the last five years are three times more likely to be infected with HIV than those who have lived in the same place for more than ten years. In an South African study, people who had recently changed their residence were three times more likely to be infected with HIV than those who had not. It is not so much movement per se, but the social and economic conditions that characterize migration processes that puts people at risk for HIV.

The role of migration in the spread of HIV to rural Africa has conventionally been seen as a function of men becoming infected while they are away from home, and infecting their wives or regular partners when they return. However, the precise way in which migration contributes to the spread of HIV and other STD's in rural areas is complex and not well understood. Partly this is because few studies have considered both ends of the migration process - those who leave home as well as those who remain behind. Understanding both ends of the migration spectrum has important implications for the development and implementation of intervention programmes, especially if it is possible to establish the relative risk of infection among different groups of migrant and non-migrant men and women.

This study set out to understand the extent to which the HIV epidemic in rural South Africa has been driven by urban migrants returning to their rural homes. The aim was to examine the social and behavioural factors that shape and determine the spread of infection from migrant men to their female partners and vice versa. The paper investigates the rates of HIV infection in migrants and non-migrants in order to understand the risk factors and transmission dynamics of the epidemic in South Africa.

The study area chosen was the Hlabisa/Nongoma Districts in Kwazulu/Natal. The paper does not mean to suggest that what happens in these districts is necessarily typical of all districts. However, the findings run counter to established ideas about urban to rural transmission and could therefore constitute a set of hypotheses to be tested in other rural districts.

The study tested the hypothesis that migrants and their partners are at increased risk for HIV compared to non-migrants and their partners, and investigated potential risk factors for HIV infection. Male migrants from two adjacent rural districts (Hlabisa and Nongoma) were recruited for the study at two migration destinations: Carletonville and Richards Bay. Three gold mines in Carletonville and three factories in Richards Bay were selected because they employ large numbers of people from Hlabisa and Nongoma districts. Those who agreed to participate were administered a detailed questionnaire and offered voluntary counselling and testing for HIV and STDs. In addition, migrant men were asked a series of questions in order to locate and identify their rural partners. Once a participating partner of a migrant man was identified, a non-migrant couple living within a radius of one kilometre of each migrant household was identified and invited to participate. In the final analysis, 260 men and 228 women took part in the study. One hundred and ninety-six migrant men were recruited at their workplaces, and 64 non-migrant men were recruited in Hlabisa/Nongoma. One hundred and thirty female partners of migrants and 98 female partners of non-migrants were recruited in Hlabisa/Nongoma Districts. None of the women were migrants.

The major findings of the research were as follows:

- The overall prevalence of HIV infection was 20.1 per cent. Prevalence among men was not significantly different from that among women (22.7 per cent v. 19.1 per cent, respectively). The prevalence of HIV among migrants and their partners was, however, significantly higher than among non-migrants and their partners (24.0 per cent versus 15.0 per cent).
- Most men reported only one current regular sexual partner, but about 30 per cent of both migrant and non-migrant men said that they had two or more regular partners. Non-migrant men were more likely to have regular partners in Hlabisa/Nongoma, while migrant men were more likely to have regular partners outside of Hlabisa/Nongoma, mostly at their migration destination.
- Migrant men were significantly more likely than non-migrant men to have at least one current casual partner, but only 20 per cent of migrant men, and 6 per cent of non-migrant men report-



ed having one or more casual partners.

- Condom use was low with more than 80 per cent of men in both groups reporting that they had never used a condom. Men who reported having many casual partners were more likely than men who reported few casual partners to have used condoms. Non-migrant men were more likely than migrant men to have used condoms in regular relationships (10.9 per cent versus 23.7 per cent). Reported use of the male condom was even lower among women than it was among men with almost 90 per cent of women saying that they had never used a condom.
- Approximately 25 per cent of men said that they had a genital ulcer at some point and 35 per cent said they had experienced genital discharge. Approximately 7 per cent of men said that they were experiencing ulcers, discharges, swollen testes or swollen lymph nodes at the time of the survey. These symptoms were equally common among migrant and non-migrant men. STD symptoms were also common among women, with 24 per cent saying that they had had a genital ulcer and 44 per cent that they had experienced a discharge. Two thirds of all women said that they had experienced discharges, ulcers and/or swollen lymph nodes. Partners of migrants were more likely to have experienced these symptoms than partners of non-migrants.
- As with the men, most of the women were married or living as married. Only one woman said that she had more than one regular partner and only three women said that they had any casual partners. Women reported having, on average, only two lifetime partners, fewer than reported by the men, suggesting that they had only ever had one partner in addition to their current regular partner.
- Amongst women, HIV infection was slightly more frequent in partners of male migrants than partners of non-migrants (21.1 per cent and 16.5 per cent respectively). The prevalence of HIV among women was not significantly associated with being the partner of a migrant or ever having used a condom. Women who had ever used a condom were as likely to be HIV-infected as those who had not.

A statistical univariate analysis showed that the most important risk factors for HIV among men were: (a) being a migrant; (b) being less than 35 years old; (c) having one or more casual partners; (d) having symptoms of STDs in the last 4 months; and (e) ever having used a condom. Those with current STD symptoms, symptoms in the last 4 months, or a history of STD symptoms were more likely to be HIV-infected than those who had never had STD symptoms. Those who had

used condoms at least once were more likely to be HIV positive than those who had not. The probability of being infected with HIV was not significantly associated with income, education or lifetime number of partners.

In a multivariate analysis the risk of HIV infection remains higher among (a) migrant than non-migrant men, (b) those who report recently having STD symptoms and (c) those who have lived in more than four places compared to only one place. Those who said that they have used condoms were actually at increased risk of HIV infection compared to those who said that they had not. But this is obviated by the fact that those who report having used condoms are also likely to have had more casual partners than those who say that they have never used condoms.

For women, the strongest association with HIV infection was with the number of lifetime partners. Women who had had more than one lifetime sexual partner were five times more likely to be infected with HIV than women who had only one lifetime partner. Age was also a significant risk factor for HIV, with younger women more likely to be infected than older women. Women who reported having sexual intercourse for the first time at or before the age of 17 years were more likely to be HIV-positive (24.5 per cent) than those who reported a later age at sexual debut (14.3 per cent).

These findings are a mix of the predictable and the counter-intuitive. With consistent use of condoms so low, it is predictable that even those who have used them at least once would show little protection from infection. Also, the study confirms that migrant men are more vulnerable to infection than non-migrant men. As expected, rates of infection among female partners of migrants were higher than amongst partners of non-migrants. However, the differences are not statistically significant. The question is how to explain the fact that 16.5% of women who were partners of non-migrants were infected with HIV. To explain this anomaly the study looked at patterns of infection amongst couples and found the following:

- Of the 168 couples in the study, 58.3 per cent were couples in which the male partner was a migrant, and 41.7 per cent in which the male partner was not a migrant. Among 69.6 per cent of couples, neither partner was infected. Migrant couples were as likely as non-migrant couples to have neither partner HIV infected (65.3 per cent versus 75.7 per cent). In 9.5 per cent of the couples, both partners were infected with HIV, and this again did not differ significantly by the migration status of the male partner
- In 20.8 per cent of the couples one of the partners was infected

and migrant couples were 2.5 times more likely than non-migrant couples to have one partner infected (26.5 per cent versus 12.8 per cent). Of these couples, the man was HIV-positive in 71 per cent of the cases and the woman in the remaining 29 per cent cases.

- Men and women are *both* more likely to be infected from outside the relationship than to be infected by their partner or spouse, whether or not the man is a migrant. Migrant men are 26 times more likely to be infected from outside the relationship than from inside the relationship; women whose partners are migrants are 2.1 times more likely to be infected from outside the relationship than from inside. The same is true for non-migrant couples but with smaller odds ratios: 10.5 for non-migrant men and 0.8 for their partners.

Migration has undoubtedly played a major role in the spread of HIV. Its precise role was more important – and more easily measured – in the early stages of the epidemic than in the later stages. The fact that the odds of a migrant man being infected is 2.4 times the odds of a non-migrant man, even at this advanced stage of the epidemic, highlights the importance of migration as one explanation of the size and rapidity of spread of the Southern African epidemic.

The patterns of HIV discordance (one infected partner) were unexpected and shed light on the role of migration in the spread of HIV to rural areas. It has long been assumed that the primary direction of spread of the epidemic has been from returning migrant men, who become infected while away at work, to their rural partners when they return home. If this were the case, the male would be the HIV infected partner in most of the discordant couples; however, in nearly one-third of the discordant couples the female was the infected partner and the male was uninfected.

While this confirms the importance of migration as a risk factor for infection in both men and women, it changes our understanding of the way in which migration enhances the risk. We have found that migration is a risk factor not simply because men return home to infect their rural partners, but also because their rural female partners – both those who are partners of migrants and those who are partners of non-migrants – are likely to become infected in the rural areas from outside their primary relationships.

One might hypothesize that with their partners absent, women are more likely to have additional sexual partners, and as a result to increase their risk of becoming infected. Additional partners may, of course, also be migrants. The fact that the patterns of HIV discordance are similar in migrant and non-migrant couples indicates that even

some partners of non-migrant men become infected prior to their husbands.

The specific circumstances in which rural women take on additional relationships needs further investigation, as well as the ways in which these relationships increase risk of HIV infection. Research is needed to better understand the complex social and sexual lives of women living in rural areas, especially in relation to the migration status of their partners. Understanding these dynamics could help to promote the development of new approaches for HIV prevention among rural women.

For everyone, male and female, migrant and non-migrant, the risk of becoming infected from outside is greater than the risk of becoming infected from inside the spousal relationship. While we expected that migrant men would be more likely to be infected from outside their spousal relationships, we did not expect that to be true for the other groups, including women whose partners were and were not migrants.

This study demonstrates the complexity of HIV transmission in the presence of large-scale male migration and the need to address the spread of disease among, especially, young rural women, not just women living in migrant relationships. What has not been acknowledged to date is the role of local, rural transmission in this complex epidemic. The findings of this study show that it is important to include rural areas if HIV treatment and prevention programmes are to succeed in reducing the spread of HIV. In addition, further work is necessary to more fully explore the complex patterns of sexual networking, particularly among women in rural areas.

Although this study focused only on male circular migration within South Africa, and from the perspective of only two rural health districts, circular migration is in fact extremely common throughout Southern Africa. It is important to recognise, however, that other types of migration do exist, and may play an important role in facilitating the dissemination of HIV throughout the Southern African region. Further studies that focus on other types of migration – particularly female migration – are urgently needed.

## INTRODUCTION

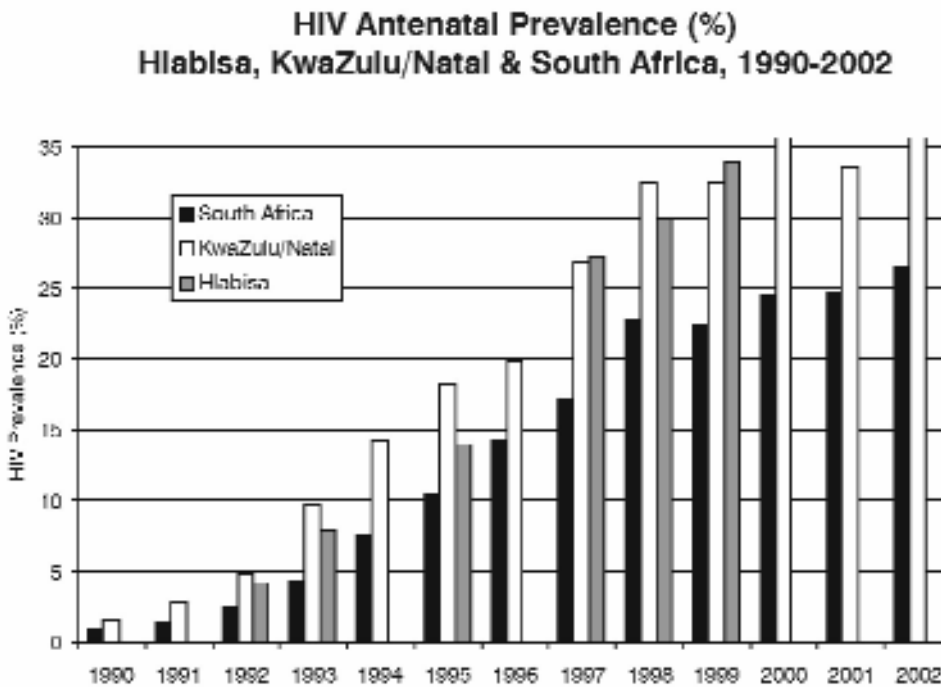
South Africa is experiencing one of the most rapidly growing HIV epidemics in the world. Among women attending antenatal clinics nation-wide, the prevalence of HIV infection increased from 0.76 per cent in 1990 to 26.5 per cent in 2002.<sup>1</sup> Among the nine South African provinces, KwaZulu/Natal has consistently had the highest antenatal HIV prevalence, which in 2000 was 36.2 per cent. The epidemic is by no means limited to urban areas. Figure 1 shows the annual increase in antenatal HIV prevalence nationally, in KwaZulu/Natal province, and in one rural district. As in the rest of Sub-Saharan Africa, the predominant mode of transmission is heterosexual intercourse (see Figure 1 on page 8).

Over the last century, migration became common among rural men seeking employment in urban and mining centres, and this persists today. In the Hlabisa District of rural KwaZulu/Natal South Africa, the site of this study, 62 per cent of adult men spend the majority of nights away from their rural homes.<sup>2</sup> Men also migrate to South Africa from neighbouring countries. Twenty years ago the gold mines employed approximately 500 000 people, about half of whom were South African, the rest coming from neighbouring countries including Botswana, Lesotho, Mozambique and Malawi.<sup>3</sup> While the number of men employed on the gold mines has fallen to about 250 000, the Southern Africa region is still linked by extraordinarily high levels of migration.<sup>4</sup> Although there are many different types of migration, the predominant mode of migration in Southern Africa is still 'circular' or 'oscillating' migration, in which young men leave their rural partners to work in urban areas, and return home periodically depending on the distances involved.

The roots of migrant labour in South Africa run deep and can be traced to the discovery of gold on the Witwatersrand in 1886, and the associated demand for cheap labour. The system of migrant labour was later a cornerstone of apartheid policy in which the movement of South Africa's black population was strictly controlled so as to maintain a separation of the races while ensuring a steady supply of labourers who were prohibited from settling permanently in 'whites-only' areas.<sup>5</sup>

Patterns of migration have, however, changed dramatically in the last decade. With the lifting of apartheid laws, the emergence of trade unions that were able to negotiate more flexible work contracts, and the rapid development of an extensive, informal, but efficient, transport infrastructure, people were able to move more freely than before. HIV, like other infectious diseases that spread from person-to-person, follows the movement of people.<sup>6</sup>

Figure 1: HIV Antenatal Prevalence (%)



Migration is one of many social factors that have contributed to the AIDS epidemic.<sup>7</sup> Several studies have shown that people who are more mobile, or who have recently changed residence, tend to be at higher risk for HIV and other sexually transmitted diseases (STDs) than people in more stable living arrangements.<sup>8</sup> In Uganda, people who had moved within the last five years were three times more likely to be infected with HIV than those who had lived in the same place for more than ten years.<sup>9</sup> In South Africa, people who had recently changed their residence were three times more likely to be infected with HIV than those who had not.<sup>10</sup> Decosas and others have argued that it is not so much movement itself, but rather the 'conditions and structure of the migration process' that puts people at risk for HIV and other sexually transmitted diseases.<sup>11</sup>

The role of migration in the spread of HIV to rural Africa has been seen primarily as a function of men becoming infected while they are away from home, and infecting their wives or regular partners when they return. This assumption of uni-directionality has been central in research on the impact of migration on the spread of HIV. In a study of seasonal migration in Senegal, Pison argued that the virus was 'mainly

transmitted first to adult men through sexual contacts met during their seasonal migration and second to their wives or regular partners once they are back home.<sup>12</sup> Other studies have shown that men who live away from their wives or regular partners are more likely than those who live with them to have additional sexual partners and are therefore at higher risk to become infected with HIV or other STDs.<sup>13</sup>

However, the precise way in which migration contributes to the spread of sexually transmitted disease is complex and not well understood. Previous studies have focused on the destinations of migrants, or, less often, on the areas from which migrants come.<sup>14</sup> Few studies have considered both ends of the migration process - those who leave home as well as those who remain behind. These studies therefore tend to give a static view of what is essentially a complex and dynamic process. Understanding both ends of migration routes is essential if targeted interventions are to be successfully implemented.

With that in mind, this study set out to understand the extent to which the HIV epidemic in rural South Africa has been driven by urban migrants returning to their rural homes – as opposed to the spread of infection within rural communities. The study also sought to understand the social and behavioural factors that shape and determine the spread of infection from migrant men to their female partners and vice versa. Understanding these questions has important implications for the development and implementation of intervention programmes, especially if it is possible to establish the relative risk of infection among different groups of men and women.

The paper investigates the rates of HIV infection in migrant and non-migrant couples in order to understand the risk factors and transmission dynamics of the epidemic in South Africa. First, the data is analysed for individuals and then couples. Next, the results of a mathematical model developed to estimate the probability of transmission from within versus outside of primary relationships are presented. Finally, the paper discusses the implications of the study findings, and present a framework for understanding different levels of causation of the HIV epidemic and interventions aimed at each level.

## METHODOLOGY

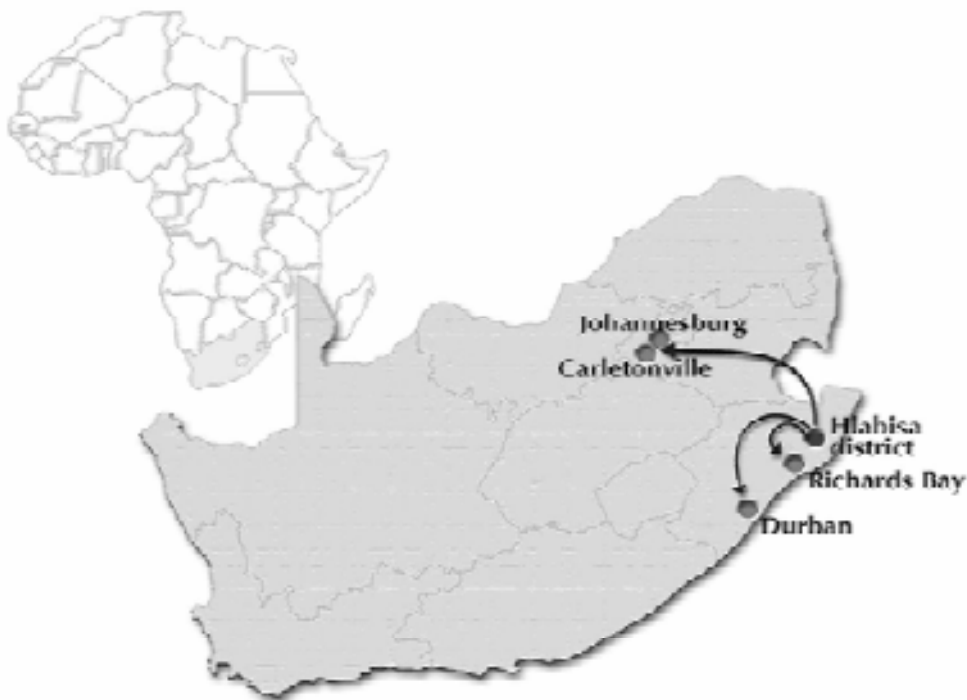
This study tested the hypothesis that migrants and their partners are at increased risk for HIV compared to non-migrants and their partners, and investigated potential risk factors for HIV infection. The study measured the prevalence of HIV, syphilis, chlamydia and gonorrhoea (although this paper reports only on HIV) among migrant men and their rural partners, and among non-migrant men and their rural partners. The study also involved a behavioural survey with the same study participants to identify social, behavioural and biomedical risk factors associated with HIV infection. A more detailed discussion of the research methodology can be found elsewhere.<sup>15</sup>

Between October 1998 and November 2000, male migrants from two adjacent rural districts (Hlabisa and Nongoma) were recruited at two migration destinations, Carletonville and Richards Bay, 700km and 100km away, respectively, from their rural homes (Figure 2). These sites were chosen because: (a) they are common destinations for migrant men from rural KwaZulu/Natal; and (b) they represent the two common types of migration prevalent in the area: long-distance migration with infrequent trips home (Carletonville), and short-distance migration with more frequent trips home (Richards Bay). Carletonville is a gold mining town southwest of Johannesburg with a population of roughly 220 000 people, of whom 80 000 are migrant men living in single-sex hostels and working on the gold mines. Because of the distances involved, these men tend to return home only three to four times a year. Richards Bay, an industrial town on the north coast of KwaZulu/Natal, is also a common migration destination for these rural men, but because of the proximity to their rural homes, they are able to return home more frequently, on average at least once a month.

Three gold mines in Carletonville and three factories in Richards Bay were selected because they employ large numbers of men from Hlabisa and Nongoma districts. Lists of workers' origins were generated, through a census in Richards Bay, and through a list provided by The Employment Bureau of Africa (TEBA), the agency responsible for recruiting men to work on the gold mines. Men from Hlabisa and Nongoma districts were invited to the project offices where the purpose of the study was explained and asked to participate. Men were only included if they were from Hlabisa/Nongoma districts, if they had been a migrant for at least six months, and if they had at least one 'regular' partner living in Hlabisa/Nongoma. A regular partner was defined through prior focus group discussions as a stable sexual partner with whom one envisions a future (*maqondana* in Zulu).<sup>16</sup> Those who were



Figure 2: Map of Study Sites



eligible and who agreed to participate were administered a detailed questionnaire and offered voluntary counselling and testing for HIV and STDs.

In addition, migrant men were asked a series of questions in order to locate and identify their rural partners. These included questions about the name of the head of the rural household, the nearest clinic and school, and specific directions to the household of the migrant man's rural partner. This information was sent to the project field office where fieldworkers visited these women and invited them to participate in the study. Once a participating partner of a migrant man was identified, a non-migrant couple living within a radius of one kilometre of each migrant household was identified and invited to participate in the study. A non-migrant man was defined as a person who spends most nights at home and who had not been a migrant for a total of more than six months over the last five years. All women were resident in

Hlabisa/Nongoma districts and none were migrants. Refusal to participate in the study and the inability to trace some partners explains why the number of men and women are not equal.

Structured, face-to-face interviews were held with each participant and included socio-economic and demographic questions, migration histories, details of stable ('regular') and casual sexual partnerships, condom use, age at sexual debut, as well as a history of, and health seeking behaviour for, current or previous urogenital disease symptoms.

All participants were offered pre- and post-test HIV counselling, free condoms at each visit, and free treatment for symptomatic or laboratory-diagnosed STDs. Participants were encouraged to receive their HIV test results, but were also given the option of not receiving them should they so desire.<sup>17</sup> Trained nurses treated symptomatic STDs at the time of enrolment using the KwaZulu/Natal provincial syndromic management guidelines.<sup>18</sup> Laboratory-diagnosed syphilis, chlamydia and gonorrhoea were treated at ten-day follow-up visits. The presence of symptomatic STDs is a major risk factor for HIV transmission and treatment is therefore likely to confer some protection against HIV infection.<sup>19</sup> Those who agreed to participate were followed up every four months.

## MIGRANT VULNERABILITY TO HIV

**B**etween October 1998 and November 2000, 260 men and 228 women were recruited for the study. One hundred and ninety-six migrant men from Hlabisa/Nongoma districts were recruited at their workplaces, and 64 non-migrant men were recruited in Hlabisa/Nongoma. One hundred and thirty female partners of migrants and 98 female partners of non-migrants were recruited in Hlabisa/Nongoma districts. Not all study participants were matched to a partner because some partners refused to participate, and in some cases it was not possible to find the partner. The overall prevalence of HIV infection was 20.1 per cent. Prevalence among men was not significantly different from that among women (22.7 per cent v. 19.1 per cent, respectively). The prevalence of HIV among migrants and their partners was, however, significantly higher than among non-migrants and their partners (24.0 per cent versus 15.0 per cent, respectively). Results are presented first by gender and then by couple.

## MALE PROFILE

The socio-demographic data for the sample of migrants and non-migrants is shown in Table 1. The average age was 39.1 years and migrants were, on average, six years younger than non-migrants. Most men had some education, and migrants tended to be better educated than non-migrants. Almost 40 per cent of non-migrants, but only 20 per cent of migrants, had never attended school, while less than 20 per cent of non-migrants, and nearly 30 per cent of migrants, had attended secondary school.

Nearly all men were either married or living as married, with similar proportions among migrants and non-migrants. Migrant men were significantly more likely than non-migrant men to derive an income from formal employment; all of the migrant men, but only 43 per cent of non-migrant men had a formal income. Almost all of the non-migrant men lived with their wives or regular partners most of the time while very few of the migrant men did. In Carletonville, all but three of the men lived in single-sex hostels provided by employers, while in Richards Bay only three men lived in employer-provided accommodation. The majority lived either alone (36 per cent), with other workers

	Men				Women			
	Migrant		Non-migrant		Partners of Migrants		Partners of Non-migrants	
Mean Age	37.4		43.6		34.2		39.1	
Level of Education (completed)	No.	%	No.	%	No.	%	No.	%
None	39	20.3	23	37.5	22	19.2	30	30.9
Grade 1-5	83	43.2	27	42.2	62	48.4	45	46.4
Grade 6-9	55	28.6	12	18.8	34	25.6	19	19.6
Matric; Matric = Cert/Dip	15	7.8	1	1.6	10	7.8	3	3.1
Current Marital Status	No.	%	No.	%	No.	%	No.	%
Married – civil	55	28.8	21	33.3	40	31.5	18	18.4
Married – traditional	80	41.9	23	38.1	55	43.3	54	55.1
Unmarried but committed or living as married	23	12.0	11	17.5	8	6.3	19	19.4
Widowed/Divorced/Separated	3	1.6	1	1.6	0		0	
Single	30	15.7	6	9.5	24	18.9	7	7.1

(17 per cent) or with relatives (22 per cent).

Most men reported only one current regular sexual partner, but about 30 per cent of both migrant and non-migrant men said that they had two or more regular partners (Table 2). Non-migrant men were more likely to have regular partners in Hlabisa/Nongoma, while migrant men were more likely to have regular partners outside of Hlabisa/Nongoma, mostly at their migration destination. Migrant men were significantly more likely than non-migrant men to have at least one current casual partner, but only 20 per cent of migrant men, and 6 per cent of non-migrant men reported having one or more casual partners. Most of the men who had casual partners were migrants below the age of thirty-five years. The median reported age of sexual debut for migrant men was 18 years and for non-migrant men 19 years. Non-migrant men reported a significantly higher number of lifetime partners than did migrant men although this may be partly confounded by age.

Condom use was low with more than 80 per cent of men in both groups reporting that they had never used a condom (Table 3). Men who were less than 35 years old were significantly more likely than older men to have used a condom. Men who reported having many casual partners were more likely than men who reported few casual partners to have used condoms. Compared to men who had no casual partners, the odds

	Men				Women			
	Migrant		Non-migrant		Migrant		Non-migrant	
Total number of current regular partners	No.	%	No.	%	No.	%	No.	%
1	133	68.9	40	62.5	130	100.0	97	98.9
2	42	21.8	16	25	0		1	1.1
> 2	10	5.2	6	9.4	0		0	
Refused	8	4.2	2	3.1				
Total number of current casual partners	No.	%	No.	%	No.	%	No.	%
0	155	79.9	60	93.8	127	97.6	98	100.0
1	16	8.3	3	4.7	3	2.3		
> 1	23	11.8	1	1.6				
Age at first sex								
Mean	18.2		18.7		17.6		17.1	
N	158		55		94		102	
Number of lifetime partners								
Mean	13.4		18.2		1.8		2.0	

	Men				Women			
	Migrant		Non-migrant		Migrant		Non-migrant	
	No.	%	No.	%	No.	%	No.	%
Ever used	32/182	17.6	14/63	22.2	25/123	11.4	11/93	11.8
Ever used with wife	6/92	6.5	5/56	8.9	10/96	10.4	6/76	7.9
Ever used in regular relationship	14/129	10.9	9/38	23.7	3/25	12	5/17	29.4
Ever used in casual relationship	12/56	21.4	0/6	0.0	2/2	100.0	0/0	0.0

of having used a condom was 1.7 among those who had one casual partner compared to 8.4 among those who had four casual partners. Non-migrant men were more likely than migrant men to have used condoms in regular relationships (10.9 per cent versus 23.7 per cent).

Approximately one-quarter of men said that they had a genital ulcer and 35 per cent said they had experienced genital discharge (Table 4). Approximately 7 per cent of men said that they were experiencing ulcers, discharges, swollen testes or swollen lymph nodes at the time of the survey. These symptoms were equally common among migrant and

	Men				Women			
	Migrant		Non-migrant		Migrant		Non-migrant	
	No.	%	No.	%	No.	%	No.	%
STD History: Ulcer	No.	%	No.	%	No.	%	No.	%
Ulcer currently	7/191	3.7	1/63	1.6	5/128	3.9	3/96	3.9
Ulcer in last four months	21/194	10.8	4/63	6.3	16/124	12.9	5/90	5.6
Ulcer ever	45/192	23.4	21/63	33.3	34/128	26.6	20/98	20.4
STD History: Discharge	No.	%	No.	%	No.	%	No.	%
Discharge currently	2/192	1.0	0/64		11/27	8.7	11/96	11.5
Discharge in last four months	10/193	5.2	1/64	1.6	39/122	31.9	15/88	17.1
Discharge ever	82/191	42.9	23/64	35.9	64/128	50.0	35/97	36.1
One or more STD symptoms*	No.	%	No.	%	No.	%	No.	%
Currently	15/192	7.8	3/64	4.7	26/128	20.3	21/98	21.4
Last four months	34/194	17.5	6/64	9.4	56/130	43.1	28/98	28.6
Ever	95/192	47.9	29/64	45.3	84/128	65.6	50/98	51.0
* One or more of: ulcer/discharge/swollen testes/swollen lymph nodes								

non-migrant men.

The prevalence of HIV among migrant men was significantly higher than among non-migrant men (25.9 per cent versus 12.7 per cent). Prevalence was higher among migrant men than among non-migrant men when stratified according to age (Table 5) although the individual within-age-group-differences were not statistically significant because of the limited sample size.

	Age					
Men	22-34		35-49		50-66	
	N	%	N	%	N	%
Migrant men	77	33.8	99	21.2	17	17.7
Non-migrant men	9	22.2	36	13.8	18	5.6
	Age					
Women	18-34		35-49		50-66	
Partners of migrants	70	25.7	53	15.1	5	20
Partners of non-migrants	29	34.5	53	7.6	14	14.3

Table 6 shows the results of a statistical univariate analyses for risk factors associated with HIV infection. The most important risk factors for HIV among men were: (a) being a migrant; (b) being less than 35 years old; (c) having one or more casual partners; (d) having symptoms of STDs in the last 4 months; and (e) ever having used a condom. Those with current STD symptoms, symptoms in the last 4 months, or a history of STD symptoms were more likely to be HIV-infected than those who had never had STD symptoms. Those who had used condoms at least once were more likely to be HIV positive than those who had not. The probability of being infected with HIV was not significantly associated with income, education, lifetime number of partners, age at sexual debut and the number of places lived over the course of a lifetime.

A more sophisticated multivariate, forward-stepwise logistic regression was carried out including all those variables that were found to be significant in the univariate analysis, as well as other variables of potential importance. In the multivariate analysis the risk of HIV infection remains higher among migrants than among non-migrant men, among those who report recently having STD symptoms and among those who have lived in more than four places compared to only one place. Those who said that they have used condoms were also at increased risk of HIV infection compared to those who said that they had not. But this is

<b>Table 6: HIV Prevalence (%) Among Men and Risk Factors</b>		
Migrant	N	% HIV+
Yes	193	25.9
No	63	12.7
<b>Monthly income</b>		
0-2000	163	23.3
2000+	79	25.3
<b>Age</b>		
< 35	95	30.5
> 35	161	18.0
<b>Level of education</b>		
None	61	18.0
Grade 1-5	110	26.4
Grade 6-10+	81	22.2
<b># of lifetime partners</b>		
< 5	52	15.4
> 5	124	23.4
<b># of regular partners</b>		
1	170	22.9
> 2	74	24.3
<b># of casual partners</b>		
0	212	19.8
> 1	43	37.2
<b>Age at first intercourse (years)</b>		
< 17	81	25.9
>17	129	20.2
<b>STD symptoms</b>		
Ever	131	27.5
Never	122	18.0
<b>STD symptoms currently</b>		
Yes	18	38.8
No	238	21.4
<b>STD symptoms last four months</b>		
Yes	40	42.5
No	216	19.0
<b>Condom use</b>		
Ever	36	32.6
Never	196	19.8
<b># of places lived, lifetime</b>		
< 4	150	22.0
> 4	106	23.6

confounded by the fact that those who report having used condoms are also likely to have had more casual partners than those who say that they have never used condoms.

## FEMALES

Of the 228 women recruited into the study, 130 were partners of migrants and 98 were partners of non-migrants. Because of the study design, none of the women were migrants. The women were, on average, about four years younger than their male partners. The level of education among women was similar to that of their male partners with a quarter of women having had no formal education and 23.5 per cent having had at least some secondary education (Table 1). Partners of migrants were significantly more educated than the partners of non-migrants. Few women in either group were formally employed. The partners of migrants were significantly more likely than partners of non-migrants to receive financial support from their partners, which is to be expected since men still migrate largely for economic reasons. Nevertheless, only half of the partners of migrant men said that they received financial support from their partner.

As with the men, most of the women were married or living as married. Nineteen percent of the regular partners of migrants and 7 per cent of the regular partners of non-migrants said that they were 'single.' Only one woman said that she had more than one regular partner and only three women said that they had any casual partners (Table 2). The median age at sexual debut, 17 years, was one year younger for women than for men. Women reported having, on average, only two lifetime partners, fewer than reported by the men, suggesting that they had only ever had one partner in addition to their current regular partner.

Reported use of the male condom was lower among women than it was among men with almost 90 per cent of women saying that they had never used a condom (Table 3). Women who reported having used a condom at least once had slightly more lifetime partners than women who had never used a condom (1.9 per cent versus 2.0 per cent).

STD symptoms were also common among women, with 24 per cent saying that they had had a genital ulcer and 44 per cent that they had experienced a discharge (Table 4). Two thirds of all women said that they had experienced discharges, ulcers and/or swollen lymph nodes, and partners of migrants were more likely to have experienced these symptoms than partners of non-migrants.

HIV infection was more frequent in partners of migrants than partners of non-migrants (21.1 per cent and 16.5 per cent respectively), although these differences were not statistically significant. Among the youngest group of women (Table 5), HIV prevalence was higher among



partners of non-migrants (34.5 per cent) than among partners of migrants (25.7 per cent). Again this difference was not significant. In the two older age groups, partners of migrants had a higher prevalence of HIV than partners of non-migrants; these differences were not significant.

Table 7 shows risk factors for HIV infection among women. The strongest association was with the number of lifetime partners. Women who had had more than one lifetime sexual partner were five times more likely to be infected with HIV than women who had only one lifetime partner. Age was also a significant risk factor for HIV, with younger women more likely to be infected than older women. Women who reported having sexual intercourse for the first time at or before the age of 17 years were more likely to be HIV-positive (24.5 per cent) than those who reported a later age at sexual debut (14.3 per cent), although this was only marginally significant.

The prevalence of HIV among women was not significantly associated with being the partner of a migrant, receiving financial support from a husband or regular partner, level of education, STD symptoms or ever having used a condom. Women who had used a condom were as likely to be HIV-infected as those who had not.

A multivariate forward-stepwise logistic regression showed that young women, and those who have had more than one lifetime partner, are at particularly high risk of infection.

## COUPLES

A total of 168 couples were recruited for the study, of whom 98 (58.3 per cent) were couples in which the male partner was a migrant, and 70 (41.7 per cent) in which the male partner was not a migrant. Table 8 presents the patterns of infection among couples. Among 69.6 per cent of couples, neither partner was infected with HIV. Migrant couples were less likely than non-migrant couples to have neither partner HIV infected (65.3 per cent versus 75.7 per cent). In 9.5 per cent of the couples, both partners were infected with HIV, and this did not differ significantly by the migration status of the male partner. In 20.8 per cent of the couples one of the partners was infected with HIV (HIV discordant), and migrant couples were 2.5 times more likely than non-migrant couples to be discordant for HIV (26.5 per cent versus 12.8 per cent). Of the 35 discordant couples, the man was HIV-positive in 25 (71 per cent) of the cases and the woman in the remaining 10 (29 per cent) cases. The proportion of men who were infected in the migrant discordant couples was essentially the same as in non-migrant discordant couples.

<b>Table 7: HIV Prevalence (%) Among Women and Risk Factors</b>		
Partner of migrant	N	% HIV+
Yes	128	21.1
No	97	16.5
<b>Monthly income</b>		
Receiving income from husband	101	14.9
Not receiving income from husband	123	21.9
<b>Age</b>		
< 35	110	25.5
> 35	114	13.2
<b>Level of education **</b>		
None	50	18.0
Grade 1-5	107	16.8
Grade 6-10+	66	24.2
<b># of lifetime partners</b>		
1	92	7.6
> 1	93	29.0
<b>Age at first intercourse (years)</b>		
< 17	102	24.5
> 17	92	14.3
<b>STD symptoms</b>		
Ever	133	20.3
Never	92	17.4
<b>STD symptoms currently</b>		
Yes	47	19.1
No	178	19.1
<b>STD symptoms past four months</b>		
Yes	84	23.8
No	141	16.3
<b>Condom use</b>		
Ever	25	28.8
Never	188	18.6

Table 9 presents social and behavioural factors associated with migration status among infected and uninfected couples. Migrant and non-migrant couples in infected and in uninfected partnerships are similar in their demographic and behavioural characteristics. There were no significant age differences between partners among migrant and non-migrant couples. The same is true of the proportion who were formally

Male	Female	Overall		Migrant Couples		Non-Migrant Couples		P*
		No.	%	No.	%	No.	%	
HIV -	HIV -	117	69.6	64	65.3	53	75.7	0.15
HIV +	HIV -	25	14.9	19	19.4	6	8.6	0.05
HIV -	HIV +	10	6.0	7	7.1	3	4.3	0.66
HIV +	HIV +	16	9.5	8	8.2	8	11.4	0.48
N		168		98		70		

\* p value comparing migrant to non-migrant couples

married, the duration of the relationship and the number of regular or casual partners. However, among infected couples non-migrant men were more likely to have had more than ten partners and non-migrant women were more likely to have had more than two partners. In those partnerships in which men reported having more than one casual partner, there was more likely to be an infection in either or both of the partners than in those partnerships for which men reported having one or no casual partners. Women who reported having two or more lifetime partners were more likely to be in relationships in which one or both members were HIV infected. Neither the number of regular partners nor the number of lifetime partners of men were significantly associated with the chances of one or both members of a couple being HIV infected.

A regression analysis for the risk of one or both partners in a couple being HIV infected was conducted. The model created new, composite variables by combining the response of the male partner with that of the female partner.

The most important factors predicting the presence of at least one HIV infected individual in a couple were: (a) age at first sexual intercourse; (b) the number of current sexual partners; and (c) having experienced STD symptoms in the last 4 months. The relative risk of HIV infection was 2.4 times higher among those whose first sexual experience was at 16 years or younger compared to those whose sexual debut was over age 16. The relative risk of HIV infection increased by 1.5 for each additional current sexual partner. Those who had STD symptoms in the last 4-months were more than two times more likely to have one or both partners HIV infected compared to those who did not have STD symptoms in the last 4 months.

<b>Table 9: Demographic and Social Factors for Couples</b>				
Variable	One or Both Partners HIV Infected		Neither Partner HIV Infected	
	Migrant (N=34)	Non-migrant (N=17)	Migrant (N=64)	Non-migrant (N=53)
<b>Age (Men)</b>				
Mean	35.0	32.6	35.1	40.3
<b>Age difference</b>				
Mean	5.1	8.9	5.4	3.6
<b>Marital Status</b>				
Married	22	8	49	40
Unmarried but committed or living as married	10	9	14	13
<b>Duration of relationship (years)</b>				
Mean	12.7	14.0	14.6	16.2
<b>No. of regular partners</b>				
1	22	9	41	36
> 1	12	8	23	17
<b>No. of casual partners</b>				
1	29	10	60	53
> 1	5	2	4	0
<b>No. of lifetime partners (men)</b>				
< 10	32	10	51	33
> 10	2	7	13	20
<b>No. of lifetime partners (women)</b>				
1 (N=96)	20	4	41	31
> 1 (N=72)	14	13	23	22

In order to estimate the relative risk of infection for migrant and non-migrant men and women from their spouse and from partners outside the relationship, a model was constructed. The details of the model have been published elsewhere.<sup>20</sup>

The model showed the probability (expressed as a percentage) that the men and women in the study were infected by someone from outside the relationship or by their spouse. Men and women are both more likely to be infected from outside the relationship than to be infected by their spouse, whether or not the man is a migrant. Migrant men are 26 times more likely to be infected from outside the relationship than from inside the relationship; women whose partners are migrants are 2.1 times more likely to be infected from outside the relationship than from inside. The

same is true for non-migrant couples but with smaller odds ratios: 10.5 for non-migrant men and 0.8 for their partners. Both men and women are more likely to be infected from outside the relationship and less likely to be infected by their spouse if they are part of a migrant couple.

## IMPLICATIONS OF RESULTS

The exceptionally high prevalence of HIV in most Southern African countries has raised important and complex questions about the factors that have contributed to the rapid spread of HIV in the region, and about the eventual prevalence the epidemic might reach. This cross-sectional, community-based study of migrant and non-migrant men, and their rural partners, has revealed a very high prevalence of HIV among both men and women. The study provides case study evidence of the importance of migration in the spread of HIV in Southern Africa, and shows that migration is a significant risk factor for HIV for men.

For men, being a migrant, and having lived in four or more places, were independent and significant risk factors for HIV infection. Thus, not only is labour migration – with its associated separation of families – an important risk factor for HIV transmission, but so too is the social disruption caused by repeated relocation, in some cases forced relocation as a result of apartheid policies and political violence.

These findings are particularly interesting, given the mature stage of the Southern African HIV/AIDS epidemic. It is likely, for example, that the relative role of migration in the spread of HIV was more important – and more easily measured – in the early stages of the epidemic than in the later stages.<sup>21</sup> Indeed, isolating a single causal factor in a mature epidemic, when prevalence is already very high, is likely to be difficult. The fact that the odds of a migrant man being infected is 2.4 times the odds of a non-migrant man being infected, even at this advanced stage of the epidemic, highlights the importance of migration as one explanation of the size and rapidity of spread of the Southern African epidemic.

The patterns of HIV discordance (one infected partner) in this study were unexpected and shed light on the role of migration in the spread of HIV to rural areas. It has long been assumed that the primary direction of spread of the epidemic has been from returning migrant men, who become infected while away at work, to their rural partners when they return home. If this were the case, the male would be the HIV infected partner in most of the discordant couples; however, in nearly one-third of the discordant couples the female was the infected partner. While this confirms the importance of migration as a risk factor for infec-

tion in both men and women, it changes our understanding of the way in which migration enhances risk. We have found that migration is a risk factor not simply because men return home to infect their rural partners, but also because their rural female partners – both those who are partners of migrants and those who are partners of non-migrants – may become infected from outside their primary relationships.

One might hypothesize that with their partners absent, women are more likely to have additional sexual partners, and as a result to increase their risk of becoming infected with HIV. Additional partners may, of course, also be migrants. The fact that the patterns of HIV discordance are similar in migrant and non-migrant couples indicates that even some partners of non-migrant men become infected prior to their husbands. Serwadda found that a similar proportion of women in HIV discordant couples were the infected partner in rural Uganda.<sup>22</sup>

The specific circumstances in which rural women take on additional relationships needs further investigation, as well as the ways in which these relationships increase risk of HIV infection. We have found in key informant interviews that women talk about the need for social, sexual, financial and emotional support, all of which are frequently lacking in long-term 'stable' relationships, particularly when the partner spends the vast majority of his time far away from home.<sup>23</sup> Research is needed to better understand the complex social and sexual lives of women living in rural areas, especially in relation to the migration status of their partners. Understanding these dynamics could help to promote the development of new approaches for HIV prevention among rural women.

The mathematical model discussed here makes it possible to estimate the probability that a person is infected either by his or her spouse or by someone outside of the relationship. For everyone, the risk of becoming infected from outside is greater than the risk of becoming infected from inside the spousal relationship. While we expected that migrant men would be more likely to be infected from outside their spousal relationships, we did not expect that to be true for the other groups, including women whose partners were and were not migrants. Interestingly, the study shows that migration reduces the risk of infection from inside the relationship and increases the risk from outside the relationship, both for men and for women. Since men who migrate to Carletonville, for example, spend relatively little time at home each year, the likelihood of them infecting their rural partners is correspondingly low, presumably as a result of the infrequent exposure.

Since most research on migration and AIDS has taken place only at male migration destinations and excluded the rural end of the migratory routes, there has been a suggestion that interventions for migrants

should be targeted at male migration destinations. Indeed, operational issues, including the ease of finding and following people, make this an attractive option. Our findings, however, demonstrate the complexity of HIV transmission in the presence of large-scale male migration and the need to address the spread of disease particularly among young rural women, not just women living in migrant relationships. What has not been acknowledged to date is the role of local, rural transmission in this complex epidemic. The findings of this study show that it is important to include rural areas if HIV treatment and prevention programmes are to succeed in reducing the spread of HIV. In addition, further work is necessary to more fully explore the complex patterns of sexual networking, particularly among women in rural areas.

By design, this study included only women who were not migrants. This was partly for operational reasons, since tracing women to many different rural districts would have been logistically challenging. Nevertheless it raises important questions about whether or not female migrants are at increased risk for HIV infection, and the extent to which non-migrant, rural women who are infected became infected as a result of contact with returning migrants as opposed to contact with men who are resident in the rural communities. The latter question cannot be answered with the available data, but in a study carried out in a township near Carletonville, women who self-identified as being migrants were 1.6 times more likely to be HIV-positive than women who self-identified as not being migrants.<sup>24</sup>

This study also shows that migrant men were significantly more likely than non-migrant men to have casual sexual partners and to be HIV-positive. More men than expected reported having no casual partners which may indicate underreporting, or that casual relationships are of short duration. For women, there was a marked reluctance – for obvious social reasons, including the fear of violence – to admit to having additional sexual partners. It is likely that, in keeping with the findings of other behavioural surveys, women in this study underreported the extent of their own sexual networks.<sup>25</sup> The reluctance of women to speak openly about whether or not they had casual relationships – even in qualitative interviews – has already been documented in this setting.<sup>26</sup> For example, women spoke of *others* taking on additional sex partners, although few would acknowledge having done so themselves. Further research, and perhaps the development of additional methods for the study of sexual behaviour in rural areas are urgently needed to shed more light on social arrangements that underlie the complex epidemiological patterns identified in this study.

## IMPLICATIONS FOR INTERVENTIONS

The high rates of self-reported sexually transmitted disease symptoms may highlight a possible target for intervention strategies. Successful syndromic management of symptomatic STDs can significantly reduce the incidence of HIV and should be a central component of HIV prevention programmes in this setting. In addition, presumptive STD treatment among sex workers on some South African gold mines has been reported to reduce the prevalence of STDs among miners.<sup>27</sup>

Although this study focused only on male circular migration within South Africa, and from the perspective of only two rural health districts, circular migration is in fact extremely common throughout Southern Africa. It is important to recognise, however, that other types of migration do exist, and may play an important role in facilitating the dissemination of HIV throughout the Southern African region. Further studies that focus on other types of migration – particularly female migration – are urgently needed.

The high prevalence of HIV among migrant men indicates that this group is an appropriate target for focused intervention strategies. At the same time, migrant interventions that concentrate exclusively at the workplace are likely to have only limited success, given that a significant amount of HIV transmission among rural women occurs irrespective of the migration status of a woman's partner. Interventions are most likely to be effective if they include both men at the workplace and women in rural communities.

Where possible, interventions should deal with migrant couples as a social unit and not just with one or the other partner. HIV prevention interventions have often been aimed at individuals, encouraging people to use condoms and reduce the number of partners. Interventions designed specifically to address the situation in which one partner is already infected are needed to protect the uninfected partner who is likely to be at high risk of infection. These interventions could include couple counselling, more aggressive treatment of STDs, antiretroviral therapy for HIV-infected partners, and education messages aimed at couples rather than individuals. Including seronegative partners in counselling interventions may decrease sexual risk-taking among serodiscordant couples.<sup>28</sup> One study found that social support resulting from couples counselling is an effective way of promoting behaviour change.<sup>29</sup> More generally, interventions aimed at couples could help improve communication within relationships, focusing on protecting those who are at high risk.<sup>30</sup>

Most social and health problems cannot be attributed to a single



causal factor; they are instead a product of the complex interaction between many factors. Sweat and Denison identified a typology of four different levels of causation of the HIV epidemic: superstructural, structural, environmental and individual.<sup>31</sup>

Starting at the highest level of causation, the superstructural level addresses the macrosocial and political environments that create advantages and disadvantages for members of society. These would include dominant societal attitudes like racism and sexism that serve to disadvantage portions of the population. In South Africa, for example, attitudes about the role of cheap black labour in the economy have dominated policies that for more than a century have served to make labour abundant to industry and other economic sectors, and to underdevelop rural sectors of the economy.

Structural factors include policies and laws that serve to exacerbate the epidemic. Examples of these laws in 20th century South Africa are abundant. The whole system of apartheid, with its “separate development” policies, set the stage for the patterns of migration that predominate in the region today.

Environmental factors that contribute to the epidemic include the living conditions, social pressures and opportunities available to individuals. Here the single-sex hostel system, easy access to commercial sex workers and alcohol would all play a part in exacerbating the epidemic. So too would the fact that truck drivers, for example, are routinely assigned to travel schedules that necessitate their being away from home for extended periods of time.

Finally, individual levels of causation of the epidemic are defined as the ways in which individuals experience and act on their environment. Levels of knowledge, risk perception, loneliness, boredom and perceived self-efficacy would contribute towards individual behaviour conducive to the spread of HIV.

Arguably, HIV interventions should occur at all levels of causation, but in reality, prevention efforts have been dominated by interventions aimed almost exclusively at the individual.<sup>32</sup> Since there are multiple causal factors that help to explain the role of migration in the spread of HIV and other STDs, successful strategies are likely to be those which address as many levels as possible. In general, public health specialists have shied away from the higher level interventions, concentrating instead on individual-level programmes. Ironically, it is the structural and environmental interventions, difficult though they are to implement, that are likely to have the most far-reaching and sustained impact.

At least two structural interventions should be considered. Employers should be encouraged to provide more family-friendly hous-

ing arrangements instead of single-sex hostels. The mining industry, for example, has moved at a painfully slow pace in this direction.<sup>33</sup> Mathematical models suggest that eliminating the single-sex hostels in favour of family-style accommodation could reduce HIV incidence by as much as 40 per cent.<sup>34</sup>

A second, and perhaps more significant structural intervention is that of encouraging rural development. This has the potential to alter the conditions that force large numbers of young men to seek temporary employment in urban areas and may well be as effective an intervention as we have. Indeed, these kinds of interventions need to be discussed not only for this particular rural health district, but for all of Sub-Saharan Africa, where large-scale population movement is the norm, not the exception.

Despite the fact that migrancy is acknowledged to be a major determining factor in the social conditions in the region, few studies have explicitly considered the impact that migrancy has on the health of people, even though the health consequences of migration may be critical to health outcomes. This study highlights the importance of migrancy as a risk factor for HIV and probably other diseases also, and the need to fully incorporate a sound understanding of public health in studies on migration.

It is ironic that the lifting of apartheid laws has led to increased mobility throughout Southern Africa, and has contributed to the spread of HIV in the region. However, while migration spreads disease, it can also be used to spread messages and interventions that can positively impact on the epidemic. Unless ways are found to deal with the combined effects of HIV and migration, it is unlikely that HIV-transmission in Southern Africa will be substantially reduced.

## ENDNOTES

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