© International Epidemiological Association 1998 Printed in Great Britain International Journal of Epidemiology 1998;27:890–896

Risk behaviours and AIDS knowledge in a rural community of Senegal: relationship with sources of AIDS information

Emmanuel Lagarde, Gilles Pison and Catherine Enel

Background The objective of this paper is to describe sources of information on HIV/AIDS and their relationship with AIDS-related knowledge and sexual behaviour in a rural area of south Senegal.

Methods A cross-sectional study using a standardized questionnaire was administered in 1994 by local interviewers to 240 men and 242 women aged 15–59 years, randomly selected from the general population.

Results Sources of HIV/AIDS information most frequently cited were radio for men (61% of men) and the local health centre for women (52% of women). Among men, citing radio as a source of information was associated with an improved overall AIDS-related knowledge (a seven-questions based average score was 4.30 for men citing radio acquired information and 5.90 for men not citing radio acquired information; $P < 10^{-4}$) and was associated with a smaller number of casual sexual partners in the 12 months preceding the interview (1.94 versus 1.48; $P = 0.04$). Women citing the local health centre as a source of HIV/AIDS information had a better perception of condom use and more often felt threatened by HIV/AIDS, but did not declare a significantly different number of casual sex partners in the 12 months preceding the interview. Television as a source was cited by 42% of men and 33% of women and was associated with an increased AIDS-knowledge score for men, with a smaller number of casual sex partners for women and with better perception of condoms for men.

Conclusion Because of its large spread and impact, radio appears to be an efficient way to reduce risk-taking behaviour among men. In addition, it is a very convenient way to reach people with high mobility such as male seasonal migrants. For women, attendance at health centres for maternity purposes is an opportunity to receive prevention messages. Finally, numerous men and women have had the opportunity to watch television when they are in towns during the migration period. This method seems to deliver effective messages.

Keywords Africa, HIV infection, prevention, Senegal, sexual behaviour

Accepted 3 February 1998

The three main prevention strategies currently employed by national AIDS control programmes are promotion of condom use, promotion of reduction in the number of sexual partners and treatment programmes for other sexually transmitted diseases (STD). The efficacy of each is unknown. Most of the previous evaluation studies were realized in developed countries and when situations in developing countries were addressed, it was almost always in urban areas and on selected groups such as female commercial sex workers[1–4] or HIV-discordant couples.[5] Interventions targeting the general population in rural areas have rarely been properly evaluated. However, knowledge of the respective efficacy of the different prevention campaigns against AIDS and STD in rural areas, where more than half of the population is living, is of particular importance today since AIDS epidemics in Africa begin to reach rural areas, often through migration.[6–7] In addition, modelling suggests that prevention efficacy is greatest in the early stages of an epidemic.[8] A study in a rural community of Senegal showed significant changes in AIDS-related knowledge and risk behaviour over a

Laboratoire d'Anthropologie Biologique (UMR 152, CNRS), Muséum National d'Histoire Naturelle, France.

Reprints requests: Emmanuel Lagarde, Laboratoire d'Anthropologie Biologique, Musée de l'homme, 17 place du Trocadéro, 75116 Pairs, France.

3-year period.[9] The purpose of this paper is to take advantage of information collected from a cross-sectional survey in 1994 in the same population. We aim to identify which of the sources of AIDS-related information could have played a significant role in inducing the knowledge and/or behavioural change we observed.

Population and Methods

Setting

The study area is part of the region of Ziguinchor, in the southwest of Senegal. It is located 50 km west of the city of Ziguinchor and 25 km north of the border with Guinea-Bissau. The population of the area has been under demographic surveillance for the past 11 years. In 1984, the authors conducted a census and have returned every year to record all new vital events (births, deaths, marriages and migrations).[10] On 1 January 1994, 7287 individuals lived in the study area.

Population

The population consists of rice farmers, mainly of animist religion. Although half of the population have Christian names, only 10% are baptized. Most married people are in monogamous union. The majority of the adult population spends half of the year or more away from the area in seasonal migration during the dry season, from November to June. Many men and women migrate seasonally before they are married, but once married, women do not migrate. Men often continue their seasonal migrations up to the age of about 60, whatever their marital status. In 1994, 57% of the women aged 15–24 years left to work as maids in the major cities of Senegal and the Gambia. Fifty eight per cent of men aged 15–34 years migrated to other regions of Senegal during the dry season, a high proportion to harvest palm-wine.

In 1990, a serological survey of the population aged ≥20 years (3230 people) revealed 27 people to be infected with HIV, a prevalence of 0.8%.[11] Prevalence was very low in those aged 20–24, and roughly constant after age 25. A case-control study showed infection to be associated with seasonal migration.[7]

Study Sample

The demographic database previously established was used to build a list of all adults aged 15–59. A sample was randomly drawn from this list. The age distribution of the whole population showed irregularities due to past migrations to urban centres. In particular, people aged 30–49 were less numerous than adjacent age groups. We thus decided to oversample the sub-population aged 30–49 by a factor of two. The sample included 262 men and 277 women. Twenty two men and 35 women away from the village could not be interviewed (11% of the whole initial sample). None of those who were present refused to participate. The final sample for the analysis consisted of 240 men and 242 women.

Comparison of the 482 subjects selected for the analysis with the 57 missing subjects not interviewed is shown in Table 1. This comparison is possible because the demographic follow-up provides us with information, such as marital and migratory status, about each individual in the entire population. Not surprisingly, we found a larger share of seasonal migrants among those who were not interviewed as they were absent (72% versus 57% in the sample; $P = 0.03$). In addition, most of them were never-married (82% versus 53% in the sample; $P = 0.0001$). Accordingly, those who were interviewed were an average of 3.4 years older than those who were absent (30.4 versus 33.8; $P = 0.05$).

Table 1 Comparison of interviewed (N = 482) and non interviewed people (N = 57)

	Sample (%)	Not interviewed (%)	*P* of the difference
Proportion of men	50	41	0.12
Proportion of seasonal migrants	57	72	0.03
Never-married	53	82	0.0001
Married	41	14	0.0001
Divorced	4	3	0.76
Widowed	2	0	0.33
Mean age	33.8	30.4	0.05

Interviews

Eight local interviewers were selected among the indigenous staff of field workers employed in the permanent demographic survey. After informed consent, interviews were conducted in private, usually in the home of the interviewees, in order to protect confidentiality. More information on interviewer's training protocol and on the interview process can be found elsewhere.[12]

Content of the questionnaire

Previous surveys on sexual behaviour conducted in the same area led us to devise a questionnaire designed to study risk behaviour and perception of HIV/AIDS and its prevention, taking into account the local sociocultural context. This questionnaire was partly inspired by the WHO Partner Relation Survey questionnaire.[13]

The following sociodemographic information was recorded: age, sex, education, marital and migratory status (those who had left the village for more than one month in the past 12 months were considered seasonal migrants).

The frequency of casual sex was to be measured by the question: 'Have you had sexual intercourse with someone other than your regular partner in the previous 12 months? If yes, how many different partners?' However, as the translation was standardized during the training programme it became apparent that this sentence was modified to: 'Have you had casual sex in the previous 12 months? If yes, how many different partners?' Only the latter question format was used.

Other variables also included knowledge and use of condoms during casual sexual intercourse, perception of condoms and perception of personal risk of becoming infected with HIV. AIDS-related knowledge was also estimated using a summary score developed from seven questions regarding routes of HIV transmission and the concept of a healthy carrier. One point was assigned for each correct answer and 0 points for each incorrect or 'I don't know' answer. People who had not heard of AIDS were given the score of 0. Thus the score ranged from 0 (no knowledge of AIDS) to 7 (very knowledgeable).

Table 2 Distribution of declared source of information on AIDS according to sex, age, marital status and matrimonial status[a]

Sources cited:	Radio % (no.)	Television % (no.)	Nurses (health centre) % (no.)	School % (no.)	Word of mouth % (no.)	Total no.
Men	61 (105)	42 (72)	25 (43)	16 (28)	26 (45)	171
Age						
15–29	56 (45)	33 (27)	25 (20)	30 (24)	27 (22)	
30–44	68 (44)	52 (34)	25 (16)	6 (4)	26 (17)	65
45–59	64 (16)	44 (11)	28 (7)	0 (0)	24 (6)	25
Marital status						
Never married	61 (71)	43 (50)	23 (27)	24 (28)	24 (28)	117
Married	62 (30)	41 (19)	26 (12)	0 (0)	30 (14)	46
Divorced or widowed[a]	50 (4)	37 (3)	50 (4)	0 (0)	37 (3)	8
Migration in the past 12 months						
In an urban area	79 (56)	56 (40)	17 (12)	24 (17)	21 (15)	71
In a rural area	55 (22)	40 (16)	25 (10)	0 (0)	30 (12)	40
No migration	45 (27)	27 (16)	35 (21)	18 (11)	30 (18)	60
Women	27 (58)	33 (72)	52 (113)	5 (11)	4 (9)	217
Age						
15–29	33 (33)	53 (52)	36 (36)	11 (11)	4 (4)	99
30–44	23 (17)	23 (17)	76 (57)	0 (0)	3 (2)	75
45–59	19 (8)	7 (3)	47 (20)	0 (0)	7 (3)	43
Marital status						
Never married	30 (32)	52 (56)	38 (41)	10 (11)	4 (4)	108
Married	27 (26)	16 (16)	65 (64)	0 (0)	4 (4)	98
Divorced or widowed[a]	0 (0)	0 (0)	73 (8)	0 (0)	10 (1)	11
Migration in the past 12 months						
In an urban area	33 (36)	52 (57)	35 (39)	9 (10)	5 (5)	110
In a rural area	67 (2)	0 (0)	67 (2)	0 (0)	0 (0)	3
No migration	19 (20)	14 (15)	69 (72)	1 (1)	4 (4)	104

[a] Among those who declared having heard of AIDS.

Similarly, perception of condoms was estimated using a summary score developed from four questions: 'Do you think a condom makes intercourse less pleasant?' (One point was assigned for a 'no' response); 'Is forbidden by my religion?' (One point was assigned for a 'no' response); 'Is too expensive' (One point was assigned for a 'no' response) and 'Protects against AIDS?' (One point was assigned for a 'yes' response). Thus the score ranged from 0 (negative perception of condoms) to 4 (positive perception of condoms).

In order to have an idea of the sources of information and public awareness about AIDS, the following question was added to the questionnaire: 'Where or from whom have you seen or heard information about AIDS?' This question was used to determine the main sources of information.

Analysis

The data were not weighted in the analysis to adjust for the oversample. However, age was used as a control variable. Variations for both qualitative and quantitative variables with declared sources of information were investigated. Mantel-Haenszel tests were performed for qualitative variables. ANCOVA analyses were performed for quantitative variables to allow for both continuous and discontinuous confounding factors. Since a large number of tests were performed, P values near 5% should be interpreted with caution. Finally, when adjusting for marital status, 'widowed' and 'divorced' categories were combined with 'never married' to reduce the effect of empty cells.

Results

Among the 240 men and 242 women interviewed, 171 men (71%) and 217 women (90%) declared that they had heard of AIDS and were included in the subsequent analysis.

Sources of information and socio-demographic characteristics

As shown in Table 2, the main sources of AIDS-related information cited by subjects were the radio for men (61%), the local health centre for women (52%) and the television for both sexes (42% of men and 33% of women). Information from school was cited by many more men (16%) than women (5%). Word of mouth was said to be a source of AIDS-related information by many more men than women (26% versus 4%, $P < 10^{-4}$, χ^2 test). Respondents were allowed to cite several

Table 3 Variations of AIDS-related indicators according to the declaration of sources of information on AIDS.[a] Men

Sources cited:	Radio		Television		Nurses (health centre)		School		Word of mouth	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Have ever heard of condoms										
No. of subject	105	66	72	99	43	128	28	143	45	126
Proportion (%)	94	92	97	91	95	93	96	93	89	95
P value[b]	ns		ns		ns		ns		ns	
Feel threatened by AIDS										
No. of subject	105	66	72	99	43	128	28	143	45	126
Proportion (%)	62	71	65	66	70	64	46	69	56	69
P value[b]	ns		ns		ns		ns		**0.04**	
At least one casual partner in the past 12 months										
No. of subject	105	66	72	99	43	128	28	143	45	126
Proportion (%)	26	24	31	21	21	27	7.1	29	24	25
P value[b]	ns		ns		ns		ns		ns	
No. of casual partners in the past 12 months[c]										
No. of subject	27	16	22	21	9	34	2	41	11	32
Mean value	1.48	1.94	1.68	1.62	1.78	1.62	1.00	1.68	1.73	1.62
Standard deviation	0.64	0.92	0.84	0.74	0.83	0.78	–	0.79	1.01	0.71
P value[d]	**0.04**		ns		ns		–		ns	
Knowledge of AIDS score										
No. of subject	105	66	72	99	43	128	28	143	45	126
Mean value	5.09	4.30	5.12	4.54	4.79	4.78	5.68	4.61	4.38	4.93
Standard deviation	1.36	1.55	1.35	1.51	1.37	1.51	1.22	1.46	1.60	1.40
P value[d]	$<10^{-4}$		**0.003**		ns		$<10^{-4}$		**0.01**	
Perception of condoms score[e]										
No. of subject	105	66	72	99	43	128	28	143	45	126
Mean value	2.26	2.26	2.49	2.09	2.16	2.29	2.11	2.29	2.27	2.25
Standard deviation	1.11	1.14	1.09	1.12	1.07	1.14	1.20	1.10	1.27	1.07
P value[d]	ns		**0.02**		ns		ns		ns	

[a] Among those who declared having ever heard about AIDS.

[b] Mantel-Haenszel test controlling for age group, marital status, migratory status and dichotomized years of schooling.

[c] Among those who declared at least one casual partner in the previous 12 months (43 out of 171 men).

[d] ANCOVA test adjusted on age group, marital status, migratory status and continuous years of schooling.

[e] The higher the score the better the perception of condoms.

sources. The miscellaneous sources not mentioned in Table 2 were cited by less than 10% of respondents. Among these others sources, the most frequently cited were local meetings (8.2% of respondents), newspapers (7.7%) and the family (7.7%).

As expected, school was mentioned only by the youngest men and women. Similarly, the younger the women were, the more they cited radio and television ($P = 0.04$ for radio and $P < 10^{-4}$ for television; trend test). Finally, the local health centre was cited as their source of AIDS information by a large proportion of women of fertile age (76% of women aged 30–44; 36% of women aged <30 years and 47% of women aged >44 years; $P < 10^{-4}$; 30–44 versus others [χ^2 test]).

There was only one difference for men according to marital status: never married men only said they had received information from school. But this result must be related to the age distribution of those citing school as an information source. The figures are more variable for women since television was mostly cited by 52% of never married and by only 16% of married women and by none of the divorced or widowed women ($P < 10^{-4}$; never married/others [χ^2 test]). Conversely, the local health centre was cited by 36% of never married women, by 65% of married women and by 73% of divorced or widowed women ($P \leq 10^{-4}$; never married/others [Fisher's test]). Once again, these results are consistent with the age distribution of the women who cited television and the local health centre as sources of AIDS information.

Men who had migrated to urban areas were much more likely to cite radio (79%) and, to a lesser extent, television (56%) as a source of AIDS-related information. Men who had not left for seasonal migration were more likely to cite the local health centre. Conversely, rural migrants and sedentary men were more likely to have heard of AIDS by word of mouth. Only three women in the sample had left for seasonal migration in rural areas since most of them are employed as maids in cities of Senegal and the Gambia. Women who had migrated to urban areas were more likely to cite television as a source of

Table 4 Variations of AIDS-related indicators according to the declaration of sources of information on AIDS.[a] Women

Sources cited:	Radio		Television		Nurses (health centre)		School		Word of mouth	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Have ever heard of condoms										
No. of subject	58	159	72	145	113	104	11	206	9	208
Proportion (%)	86	73	78	76	77	76	91	76	78	76
P value[b]	ns		ns		ns		ns		ns	
Feel threatened by AIDS										
No. of subject	57	159	72	144	112	104	11	205	9	207
Proportion (%)	79	67	79	66	79	61	73	70	67	71
P value[b]	ns		**0.01**		**0.01**		ns		ns	
At least one casual partner in the past 12 months										
No. of subject	58	159	72	145	113	104	11	206	9	208
Proportion (%)	21	21	22	21	20	22	9	22	22	21
P value[b]	ns		ns		ns		ns		ns	
No. of casual partners in the past 12 months[c]										
No. of subject	12	34	16	30	23	23	1	45	2	44
Mean value	2.00	2.18	1.62	2.40	2.04	2.22	2.00	2.13	5.00	2.00
Standard deviation	1.35	1.22	0.72	1.38	1.30	1.20	–	1.25	1.41	1.08
P value[d]	ns		**0.05**		ns		–		–	
Knowledge of AIDS score										
No. of subject	58	159	72	145	113	104	11	206	9	208
Mean value	5.12	4.87	5.03	4.90	4.99	4.88	6.00	4.88	4.89	4.94
Standard deviation	1.04	1.48	1.37	1.39	1.21	1.55	0.63	1.39	1.54	1.38
P value[d]	ns		ns		ns		**0.007**		ns	
Perception of condoms score[e]										
No. of subject	58	159	72	145	113	104	11	206	9	208
Mean value	2.50	1.88	2.14	2.00	2.22	1.86	2.64	2.01	2.11	2.04
Standard deviation	1.37	1.54	1.50	1.53	1.55	1.46	1.29	1.53		
P value[d]	**0.003**		ns		**0.05**		ns		ns	

[a] Among those who declared having ever heard about AIDS.

[b] Mantel-Haenszel test controlling for age group, marital status, migratory status and dichotomized years of schooling.

[c] Among those who declared at least one casual partner in the previous 12 months (46 out of 216 women).

[d] ANCOVA test adjusted on age groups, marital status, migratory status and continuous years of schooling.

[e] The higher the score the better the perception of condoms.

information and, to a lesser extent, radio. Whereas the women who did not leave for seasonal migration were more likely to cite the local health centre as a source.

Sources of information and AIDS-related variables

To evaluate the impact of sources of information, the variations in a set of indicator variables have been tabulated according to the various sources of information in Table 3 (men) and Table 4 (women). As shown in Table 2, the socio-demographic features of the subjects partly explained the AIDS-related information source available. Accordingly, the following analysis makes use of adjusted tests on age groups, marital status, migratory status and, for quantitative dependent variables only, the number of years of schooling.

For both men and women, no specific source of information was associated with an increased proportion of those who said they had heard of condoms. On the contrary, men who said they had heard of AIDS by word of mouth were less likely to feel threatened by AIDS than the others (56% against 69%; $P = 0.04$). Women who have heard of AIDS from television and at the local health centre were more likely to feel threatened by AIDS ($P = 0.01$ for both comparison tests).

The sources of information which were associated with better AIDS-related knowledge were schools and, for men only, radio and television. Here again, having heard of AIDS by word of mouth is associated with a decreased knowledge of AIDS score.

Similarly, the perception of condoms was investigated in a summary score. Women who cited radio and men who cited television had a more positive perception of condoms than others (the score increased from 1.88 to 2.50 for women and from 2.09 to 2.49 for men; $P = 0.003$ and $P = 0.02$ respectively).

Behavioural change towards AIDS-risk reduction has been investigated analysing the association between sources of information and the number of casual sex partners in the last 12 months. No source was found associated with a lesser

proportion of those who said they had had casual sex in the past 12 months. However, among those who said they had had casual sex, citing radio as a source of information was associated with a reduced number of casual partners for men (from 1.94 to 1.48; $P = 0.04$), while television was associated with a reduced number of casual partners for women (from 2.40 to 1.62; $P = 0.05$). The latter two sources might therefore be instrumental in reducing the number of at-risk sexual partnerships (the significance of both tests are at the limit of the rejection region), but did not induce a significant constraint on this type of sexual intercourse.

Discussion

We have interviewed a sample of 482 adults aged 15–59 years on their sexual behaviour and their knowledge of AIDS, with a special focus on sources of AIDS information.

The sources of AIDS information most frequently cited were radio for men and the local health centre for women. Among men, citing radio was associated with improved overall AIDS-related knowledge and with a decreased number of casual sex partners during the past 12 months. Women citing the local health centre as a source of AIDS information had a more positive perception of condoms, more often felt threatened by HIV/AIDS but did not differ from the women who did not cite the local health centre as a source of knowledge with respect to the number of casual sex partners. Television was cited by 42% of men and by 33% of women and was associated with an increased AIDS-knowledge score for men, with a smaller number of casual sex partners for women and with a better perception of condoms for men.

Differences in marital status and age between the individuals of the sample and those who were initially selected but could not be interviewed, may have induced a selection bias in the final sample. Similarly, as mentioned above, males and females aged 30–49 years were oversampled since, for reasons of population structure, the size of this age group was small. However, it is unlikely that those not interviewed would differ in their sexual behaviour or AIDS knowledge.

The sources of information do not reach people randomly. For this reason, it is impossible to state with firmness that our results demonstrate the crude impact of each source since the differences observed could stem from a common characteristic shared by people who received information from the particular source. In other words, our results could be biased by background confounding factors. For example, watching television is the attribute of certain socio-demographic categories: only five television sets are available in the village (for 7287 habitants). Yet, urban seasonal migrants may have a greater opportunity to watch television in towns. The apparent 'effect' of this source of information may, therefore, reflect the differential knowledge or behaviour of this subgroup of the population. However, we allowed for several important demographic characteristics in the analysis: sex, age, marital status, migratory status and schooling levels. Previous analysis found no additional background characteristics associated with different knowledge or behaviour[12] and which could be associated with differential access to AIDS-related information sources.

Extensive data on the content of prevention messages from each of the media were not collected. All are based on the Senegalese 'Programme National de Lutte contre le SIDA' recommendations that could have been interpreted differently by the various media. The main messages from radio and television are the reduction in numbers of partners, increased fidelity and condom use. The catholic health centre delivers the same messages except for that of condom use.

Our results, together with changes demonstrated elsewhere,[9] suggest one aspect of the role of community intervention on AIDS-related knowledge and the positive impact of the media on behavioural changes. Of the media, radio plays a very important role partly because of its low price, its autonomy and its large audience.

Results from the study on behaviour and knowledge changes showed that women improved their AIDS-related knowledge more markedly than men, starting with a low level and acquiring greater knowledge than men.[9] This different pattern may be explained by a different schedule in information availability: since radio-mediated prevention messages have been heard for nearly a decade by men during their seasonal migration into nearby cities (radio is much more often used by men), women appeared to have been informed mainly by local meetings which have been implemented more recently. Another explanation would be that men of a wide age range are living together during the time they are harvesting palm-wine. This age mixing could explain the earlier improvement of AIDS knowledge among men.

Women cited the local health centre as a source of information more frequently than men. This is because they attend pre- and postnatal check-ups arranged by nurses at the local health centre; and later they take their children to the same health centre for treatment. On these occasions, they are informed about AIDS and STD.

There is no electric supply network in the area and television can only be watched either during the migration period in urban areas, or at the health centre where information meetings include videos shown on a television, using a generator as power source. This may explain the higher proportion of women citing television as an information source because they attend health centre activities more often than men.

The lower proportion of women (6%) compared with men (11%) who cited school as a source of AIDS knowledge is consistent with the lower educational level of women. In 1985, a survey found that in the age group 10–14 years 94% of boys and 47% of girls attended school or had completed at least one year of schooling.[10]

Finally, even if differences in knowledge and behaviour according to citing specific sources of AIDS information are not crude evidence of the relationship between source and knowledge or behavioural change, several points suggest that this is the most probable situation: (i) the question concerned the sources of AIDS-related information and not media access in general; (ii) knowledge and behavioural changes were demonstrated eslewhere;[9] (iii) media access is mainly determined by socio-demographic factors and we allowed for these factors in the analysis. However, it is now necessary to find out how to reach those without knowledge of AIDS and to review the messages imparted through the various sources to improve their breadth and consistency. Cohort-based studies are also needed to confirm and understand better the various factors involved in the response toward AIDS epidemics.

Acknowledgements

The authors are indebted to Alfred Spira, Jamie Robinson and Josiane Warzawsky for their comments on a previous version of the manuscript and to Michel Caraël for his help in the design of the questionnaire.

This research was supported by the Muséum National d'Histoire Naturelle, the Centre National de la Recherche Scientifique (UMR152), the Agence Nationale de Recherches sur le Sida, Paris, France.

References

[1] Ngugi EN, Plummer FA, Simonsen JN *et al.* Prevention of transmission of human immunodeficiency virus in Africa: effectiveness of condom promotion and health education among prostitutes. *Lancet* 1988;**15**: 887–90.

[2] Williams E, Lamson N, Efem S, Weir S, Lamptey P. Implementation of an AIDS prevention program among prostitues in the Cross River State of Nigeria [letter]. *AIDS* 1992;**6**:229–30.

[3] Wilson D, Lavelle S. AIDS prevention in South Africa. A perspective from other African countries. *S Afr Med J* 1993;**83**:668–74.

[4] Asamoah-Adu A, Weir S, Pappoe M, Kanlisi N, Neequaye A, Lamptey P. Evaluation of a targeted AIDS prevention intervention to increase condom use among prostitutes in Ghana. *AIDS* 1994;**8**:239–46.

[5] Kamenga M, Ryder RW, Jingu M *et al.* Evidence of marked sexual behavior change associated with low HIV-1 seroconversion in 149 married couples with discordant HIV-1 serostatus: experience at an HIV counselling center in Zaire. *AIDS* 1991;**5**:61–67.

[6] Nunn AJ, Wagner HU, Kamali A, Kengeya-Kayongo, Mulder D. Migration and HIV-1 seroprevalence in a rural Ugandan population. *AIDS* 1995;**9**:503–06.

[7] Pison G, Le Guenno B, Lagarde E, Enel C, Seck C. Seasonal migration: a risk factor for HIV infection in rural Senegal. *J Acquir Immun Defic Syndr* 1993;**6**:196–200.

[8] Potts M, Anderson R, Boily MC. Slowing the spread of human immunodeficiency virus in developing countries. *Lancet* 1991;**338**: 608–13.

[9] Lagarde E, Pison G, Enel E. Improvement in AIDS knowledge, perceptions and risk behaviours over a short period in a rural community of Senegal. *Int J STD & AIDS* 1997;**8**:681–87.

[10] Pison G, Trape JF, Lefebvre M, Enel C. Rapid decline in child mortality in a rural area of Senegal. *Int J Epidemiol* 1993;**22**:72–80.

[11] Le Guenno B, Pison G, Enel C, Lagarde E, Sy A. HIV2 seroprevalence in three rural regions of Senegal: low levels and heterogeneous distribution. *Trans Roy Trop Med Hyg* 1992;**86**:301–02.

[12] Lagarde E, Pison G, Enel E. Knowledge, attitudes and perception of AIDS in rural Senegal: relationship to sexual behaviour and behaviour change. *AIDS* 1996;**10**:327–34.

[13] Ferry B, Deheneffe JC, Mamdani M, Ingham R. Characteristics of surveys and data. In: Cleland J, Ferry B (ed.). *AIDS in the Developing World*. London: Taylor and Francis, 1995, pp.10–42.