Evidence of stable HIV seroprevalences in selected populations in the Democratic Republic of the Congo

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Objective: To determine current data on HIV infection and to document changes and trends of HIV seroprevalence in selected populations over time in the Democratic Republic of the Congo (DRC; former Zaïre).

Methods: In February 1997, a large serosurvey was conducted on selected population groups from Kinshasa (capital city), Mbuji-May (southeast) and Bwamanda (northwest). Samples obtained from pregnant women, tuberculosis patients, commercial sex workers, blood donors and sexually transmitted disease patients were screened for the presence of HIV antibodies by a rapid assay and a commercial enzyme-linked immunosorbent assay. All reactive specimens were confirmed and discriminated by a line immunoassay, and were further tested for the presence of HIV-1 group O antibodies. Our results were compared to data reported in previous studies in Kinshasa.

Results: Of a total 1970 samples collected, 219 (11.1%) were HIV-1-reactive and seven (0.3%) were dually reactive to HIV-1 and HIV-2. No case of HIV-1 group O or HIV-2 infection was diagnosed. HIV seroprevalence in pregnant women was 3.1% (16 out of 511), 6.3% (19 out of 300) and 1.5% (one out of 65) in Kinshasa, Mbuji-Mayi, and Bwamanda, respectively. HIV seroprevalence in tuberculosis patients was 26% (52 out of 200), 28% (17 out of 60), and 35.3% (29 out of 83), respectively. HIV seroprevalence among blood donors was 3.1% in Kinshasa and 2.8% in Mbuji-Mayi. Compared with data from previous studies performed in Kinshasa, no substantial change in HIV infection rates was observed among the selected population groups.

Conclusions: Our results show that HIV prevalence rates have remained relatively unchanged in selected populations despite the political instability and poor environment observed since 1991 in DRC. It also shows the presence, still at very low rate, of dual HIV-1/HIV-2 seropositivity and a growing problem of HIV infection in rural areas. In contrast to other Central African countries, no HIV-1 group O infections were detected in DRC.

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Introduction

The Democratic Republic of the Congo (DRC; formerly Zaïre) is located in the well-established HIV-1 epidemic of Central Africa. Since 1984, the government of the DRC was one of the first in Africa to endorse a national policy for HIV/AIDS prevention and control. The Ministry of Health has been committed to basic research and epidemiological studies on HIV/AIDS through 'Projet SIDA' in collaboration with the US Centers for Disease Control and Prevention and the Institute of Tropical Medicine (Antwerp, Belgium). This initiative has generated reference data regarding HIV prevalence, behavioural, biological and demographic factors as well as reports of preventive interventions [1–7].

In 1991 and 1993 there was a political crisis that generated a highly disorganised environment both politically and socially. From 1993 much less has been known about the HIV/AIDS epidemic in the DRC compared with other sub-Saharan African countries. Taking into account the recent civil war in Rwanda, the subsequent population displacement in the Great Lakes region and the social disruption in former Zaïre, a change in the HIV/AIDS situation in DRC with maybe unpredictable or disastrous consequences could be expected and need to be assessed. Between February and April 1997, we conducted a serosurvey in selected populations from three geographic locations in the DRC. The purpose of the study was to determine current HIV prevalence in selected population groups.

Material and methods

Study sites

Considering the large size of the country, the study reported here was carried out in the regions indicated in Fig. 1. Kinshasa is the capital city, economic centre and focal point that links the country to other continents. Mbuji-Mayi, in the Kasaï oriental province, is in the southeastern part of the country, and is a second world producer of industrial diamond. In 1993, the city experienced a rapid demographic change as a consequence of the displacement of hundreds of thousands of people from the Shaba province who arrived as refugees. Bwamanda is in the Equateur province, and is a rural town situated in the northwestern part of the country, neighbouring the Central African Republic. It is well known for its coffee culture, which constitutes the main economical activity and source of income for the local population. Mbuji-Mayi and Bwamanda are fairly rural compared with Kinshasa.

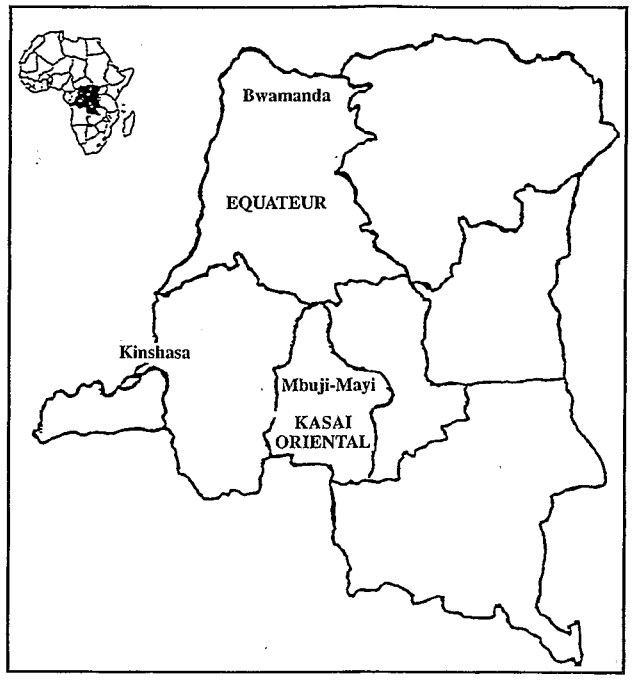

Fig. 1. Map of the Democratic Republic of the Congo.

Study population and data collection

We conducted a series of cross-sectional surveys in convenience samples of five population groups. Pregnant women (n = 876) were selected from five antenatal clinics (two in Kinshasa, two in Mbuji-Mayi, and one in Bwamanda). On the day of the survey, each woman (whether a first attender or not) was consecutively enrolled after informed consent and whatever the term of pregnancy. Hospitalized tuberculosis patients (n = 342) and blood donors (n = 356) were recruited from Bonzola Hospital (Mbuji-Mayi) and Kabila Hospital (former Mama Yemo in Kinshasa). In the hospital in Bwamanda only tuberculosis patients were recruited; tuberculosis patients were defined as being hospitalized for proved tuberculosis infection diagnosed by positive smear test. Symptomatic AIDS patients had been hospitalized in each of the three hospitals. Blood donors were also consecutively enrolled at the blood bank of the hospital. Sexually transmitted disease (STD) patients (n = 226) and commercial sex workers (CSW; n = 124) were recruited at STD clinics in Kinshasa and Mbuji-Mayi. An additional limited sample from male clients of CSW (n = 26) was collected at the hotel where CSW worked. For each person and after informed consent (the study was approved by the National Ethical Committee and the National AIDS Programme) a brief epidemiological questionnaire was completed and a blood sample was collected in an EDTA tube. Information on age, sex, marital status, ethnicity, sexual behaviour and clinical signs or symptoms were collected on the data sheet.

HIV testing

A total of 1970 samples were collected: 1361 from

Kinshasa, 462 from Mbuji-Mayi, and 147 from Bwamanda. Initial screening for HIV antibodies was performed using the latex agglutination assay (Capillus HIV1/2, Cambridge Diagnostic, Galway, Ireland) or a commercial enzyme-linked immunosorbent assay (ELISA; Murex ICE 102; Murex, Dartford, Kent, UK). All reactive specimens were confirmed and discriminated using a line immunoassay (Innolia HIV1/2, Innogenetics, Ghent, Belgium), and were further tested for the presence of HIV-1 group O antibodies using a specific V3 ELISA [8].

Data analysis

Epidemiological data and serological results were analysed statistically using EpiInfo (version 6.0; Centers for Disease Control and Prevention, Atlanta, Georgia, USA). χ^2 tests were used to compare differences in HIV prevalences.

Results

Characteristics of the study population

The population groups were predominantly young adults aged 20–30 years and only 1.3% of them had travelled outside the DRC for longer than 3 months. Childbearing women were young (mean age, 25.2 years; SD, 6.3), predominantly married, and 10% of them were in polygamous marriages. For the hospitalized tuberculosis patients, the male-to-female ratio was 1.2 : 1 (185 men, 157 women). The women were younger than the men with a mean age of 29.8 years (SD, 12.6) versus 32.1 years (SD, 12.7) years. Most CSW were single, full-time, low income class prostitutes; only 10% of CSW were foreigners (mostly from Angola), and they had a mean age of 24.9 years (SD, 5.8). The majority of blood donors were men and non-commercial donors (family members). More women than men were enrolled in the study when attending the STD clinic in Kinshasa (133 women versus 93 men). They were younger than the men, with a mean age of 28.3 years (SD, 7.8) versus 32.6 years (SD, 12.7) .

HIV seroprevalence in the study population groups

Table 1 describes the seroprevalences in different locations and populations studied. HIV-1 was predominant, with 219 (11.1%) out of 1970 samples HIV-1-reactive and only seven (0.3%) samples dually reactive for HIV-1 and HIV-2. No cases of HIV-1 group O or HIV-2 were diagnosed in this study. Seroprevalence among pregnant women was low in Kinshasa (3.1%) and Bwamanda (1.5%). The rate was significantly higher among pregnant women in Mbuji-Mayi (6.3%) compared with women in Kinshasa ($P = 0.03$, $\chi^2 = 4.69$), and two out of the 19 HIV-positive pregnant women in Mbuji-Mayi were dually reactive for HIV-1 and HIV-2.

High rates of HIV seroprevalence were observed in tuberculosis patients. The HIV seroprevalence was 26, 28, and 35.3%, respectively, in Kinshasa, Mbuji-Mayi and Bwamanda. No distinct regional differences were observed in the rate of HIV infection among this group. Dual infection, although at very low rate, was also diagnosed among tuberculosis patients: 1% in Kinshasa, 1.6% in Mbuji-Mayi, and 1% in Bwamanda.

Samples from blood donors, CSW and STD patients were collected in only two locations (Kinshasa and

Table 1. HIV prevalence per population groups and per city.

Population groups	No. tested	n (%) HIV-1	HIV-1+ HIV-2	Total HIV	χ^2	*P*
Childbearing women						
Kinshasa	511	16 (3.1)		16 (3.1)		
Mbuji-Mayi	300	17 (5.6)	2 (0.6)	19 (6.3)		
Bwamanda	65	1 (1.5)		1 (1.5)	6.10	0.04
Total	876	34 (3.8)	2 (0.2)	36 (4.1)		
Tuberculosis patients						
Kinshasa	200	50 (25)	2 (1)	52 (26)		
Mbuji-Mayi	60	16 (26)	1 (1.6)	17 (28)		
Bwamanda	82	28 (34)	1 (1.2)	29 (35.3)	2.5	0.2
Total	342	94 (27.4)	4 (1.1)	98 (28.6)		
Blood donors						
Kinshasa	321	10 (3,1)		10 (3.1)		
Mbuji-Mayi	35	1 (2.8)		1 (2.8)		
Total	356	11 (3.0)		11(3.0)		
Female commercial sex workers						
Kinshasa	100	29 (29)		29 (29)		
Mbuji-Mayi	24	7 (29)		7 (29)		0.99
Total	124	36 (29)		36 (29)		
Sexually transmitted disease patients						
Kinshasa	214	26 (12.1)		26 (12.1)		
Mbuji-Mayi	12	1 (8.3)		1 (8.3)		
Total	226	27 (11.9)		27 (11.9)		

Mbuji-Mayi). In Kinshasa, HIV seroprevalence among blood donors was 3.1% (10 out of 321) and 12.1% (26 out of 214) among patients attending the STD clinic. Among CSW, 29% were HIV-positive in both Kinshasa and Mbuji-Mayi, but the sample size in Mbuji-Mayi was very small and HIV seroprevalence among the limited sample of male clients of CSW was 23% (six out of 29). History of travel outside DRC was not significantly associated with HIV and no significant impact was revealed with marital status. No dual reactivity was found among blood donors, CSW, STD patients or male clients of CSW in this study.

HIV seroprevalence by age group and gender

When stratified by age, no significant difference was observed in the seroprevalence rate among pregnant women. However, infection was higher in women aged less than 20 years in Mbuji-Mayi (3.0%) compared with women in the same age group in Kinshasa (1.9%) and Bwamanda (0%; $P = 0.02$, $\chi^2 = 4.97$). Our study shows that 34.2% of HIV infection occurred in tuberculosis-infected women aged 20–30 years compared with men in the same age group ($P = 0.001$, $\chi^2 = 9.6$), whereas among men with tuberculosis, the highest HIV infection rate (42.2%) was observed in those aged > 40 years.

Trends in HIV seroprevalence

We compared the data obtained in this study with data reported in previous studies by Projet SIDA in Kinshasa since 1988 [9–20]. Although we were aware of the limitations of our data and the selection bias in our sample collection that could make comparisons difficult (this study was performed during a very unstable political period), we believe that given the environmental change that DRC has experienced, these results will document the HIV distribution in different populations and provide a useful basis for examining trends over the last 10 years. Pregnant women, blood donors, tuberculosis patients and CSW from Kinshasa represent the groups where sequential data are available. HIV seroprevalence among pregnant women, tuberculosis patients, blood donors and CSW in Kinshasa has seemed to have stabilized over time in these populations (Table 2).

Table 2. HIV seroprevalence in selected populations in Kinshasa.

Years	No. tested	HIV-1 (%)	Reference
Childbearing women			
1988	7364	6.7	[4]
1989	6764	5.8	[10]
1990	1851	4.7	[11]
1991	4237	4.2	[12]
1992	NR	5	[13]
1994	496	4.6	[14]
1997	511	3.1	Present study
Blood donors			
1988	3875	5.5	[15]
1989	2237	3.5	[9]
1990	NR	3.4	[9]
1991	NR	3.3	[9]
1992	NR	3.0	[9]
1996	NR	4.9	[16]
1997	321	3.1	Present study
Tuberculosis patients			
1988	234	38	[17]
1991	NR	33	[16]
1997	200	25	Present study
Female commercial sex workers			
1988	1233	35	[18]
1989	NR	38	[13]
1990	NR	30	[13]
1991	182	30.2	[19]
1994	959	35	[20]
1997	100	29	Present study

NR, Not reported.

Discussion

Since 1993, little is known about the HIV/AIDS situation in DRC compared with other sub-Saharan African countries. We have reported data on HIV infection rates collected in 1997 in selected population groups from three different locations: Kinshasa the capital city, Mbuji-Mayi in the southeast, and Bwamanda in the northeastern part of DRC. Despite the social disruption, the rapid decline in health-care provision, and the decrease in funding in health education programmes, our results show that the HIV seroprevalence rates remain relatively low and stable in DRC.

Not surprisingly, HIV-1 infection is predominant, although we documented the presence of dual HIV-1 and HIV-2 seropositivity at a very low rate (3.4% of HIV-positive samples) in the three study sites. Up until now, no HIV-2 or dual infections have been reported in the DRC [2]. The presence of HIV-1 and HIV-2 infection in DRC could be explained by the proximity of Angola, where HIV-2 infection has been reported [21], and also by the strong trading and travel link between DRC and other West African countries where HIV-2 is prevalent [22].

No significant regional difference was observed in relation to HIV seroprevalence. However, HIV seroprevalence among pregnant women in Mbuji-Mayi, a rural area, was significantly higher (6.3%) than that observed in Kinshasa (3.1%; $P = 0.03$), although Mbuji-Mayi cannot be considered as a typical rural area because of its diamond mining industry.

Our study suggests that HIV seroprevalence has stabilized in some population groups in DRC as has recently been observed in Uganda [23] or Gabon [24] but at a different level. Nevertheless, our data on convenience samples are not sufficient to state that HIV seroprevalence has stabilized in the entire country. This observation raises two questions. First, why is the level of the apparent stability of the HIV prevalence in some population groups so different according to the capital

city of different countries? Second, what is the interpretation of a stable HIV prevalence with regard to the dynamics of the epidemic?

The spread of HIV could be influenced by demographic, behavioural, biological or socioeconomic factors [25,26]. In this context, the political crisis and the economic recession experienced by the DRC in 1991 and 1993 led to a rapid decline of health services and created an environment that could facilitate the spread of HIV. One can speculate that this crisis could increase the population at risk for HIV infection through social disruption and poverty, as most former Zaïrians were worse off in terms of average incomes per capita (less than US$ 1 per month). This seemed not to be the case, and the real signification of this stable HIV prevalence is not clear.

Difficulties in interpreting trends in prevalence and incidence arise from potential changes in health-care utilization patterns [26,27] and a shift in population characteristics due to the crisis could introduce a bias. Furthermore, as first outlined by Batter *et al.* [28], trends in HIV prevalence may not reflect trends in mature epidemics. A stable seroprevalence might be maintained by a dynamic balance between the number of new infections and the number of deaths from AIDS and may hide a high incidence in young people. We could therefore attribute the low and stable prevalence to the high HIV-related mortality as a consequence of the deterioration of the health services and the high degree of poverty as observed in Uganda [23]. However, the high degree of poverty experienced in the country as a result of the political and socioeconomic crisis could have contributed in the change of sexual behaviour.

In conclusion, this study provides important information from a country where the political crisis and the war have led to the total disorganization of the health-care system. Surprisingly, HIV prevalence remained relatively low and stable in some population groups. This could not be attributed to any preventive activities, and again highlighted that our knowledge on the factors that influence the spread of HIV remains incomplete. However, data on HIV incidence are needed, although extremely difficult to collect, before being able to state that the HIV epidemic has stabilized in DRC.

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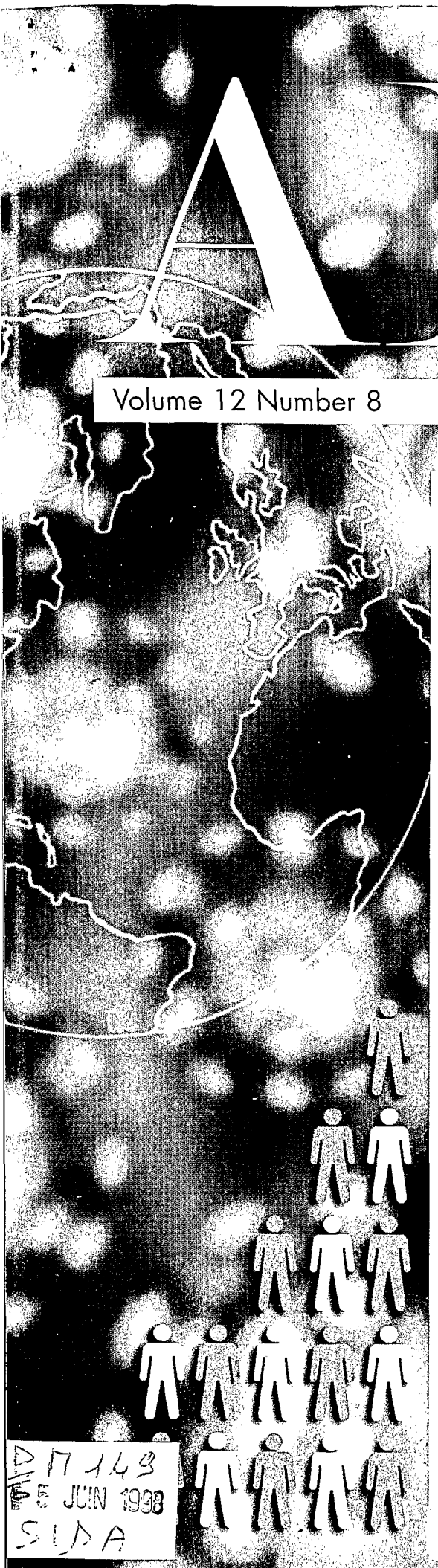

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