

HIV infection and AIDS in a small municipality in Southeast Brazil

Infecção pelo HIV e Aids em um pequeno município no Sudeste brasileiro

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Keywords

Acquired immunodeficiency syndrome, epidemiology. HIV infection, epidemiology. Small counties/municipalities. Brazil.

Abstract

Objective

Studies on the aspects of HIV infection in small Brazilian municipalities are invaluable to appropriately design control strategies, better allocate resources, and improve health care services. The objective of the study was to assess the clinical and epidemiological aspects of HIV infection in a small municipality.

Methods

A descriptive study was carried out in Miracema, a small municipality in the northwestern area of the state of Rio de Janeiro, Brazil, between July 1999 and December 2003. All HIV-infected adult patients followed up at the local HIV/AIDS Program were included. Clinical and epidemiologic characteristics were prospectively assessed through standardized questionnaires.

Results

A total of 65 adult patients who attended the local HIV/AIDS Program were analyzed. Most (34) were women (male to female ratio: 0.9). An absolute predominance of patients who were born in Miracema or neighboring municipalities (94%), lived in Miracema (90.7%), were single (70.8%), attributed the acquisition of HIV infection to unprotected heterosexual intercourse (72.3%) and had a past history of snorting cocaine (27.7) was found Central nervous system disorders (including five cases of cryptococcal meningitis) and acute pulmonary pneumocystosis-like respiratory failure were major causes of morbidity. Most patients (56.9%) were at presented in advanced stages of HIV infection.

Conclusions

The predominance of patients on advanced stages of HIV infection suggest the existence of a large pool of undiagnosed cases in the community. A major feature of the cohort was an inverted male to female ratio. Further investigations over a broader geographic area are urgently needed for better understanding the clinical and epidemiological characteristics of HIV infection in small Brazilian municipalities and rural areas.

Resumo

Objetivo

Estudos sobre as características da infecção pelo HIV em pequenos municípios brasileiros são de grande importância para o desenho de estratégias de intervenção, para a alocação apropriada de recursos e melhoria da assistência. O objetivo foi

Decritores

Síndrome de imunodeficiência adquirida, epidemiologia. Infecção por HIV, epidemiologia. Assentamentos rurais. Pequenos municípios. Brasil.

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investigar as características clínicas e epidemiológicas da infecção pelo HIV em um pequeno município.

Métodos

Foi realizado estudo descritivo em Miracema, município do noroeste do Estado do Rio de Janeiro, entre julho de 1999 e dezembro de 2003. Foram analisados todos os pacientes adultos com diagnóstico de infecção pelo HIV atendidos no Programa Municipal de HIV/Aids. Dados clínicos e epidemiológicos foram coletados prospectivamente por meio de questionário padronizado.

Resultados

Foram analisados no total 65 pacientes adultos que receberam atendimento no Programa Municipal de HIV/Aids. A maioria (34) eram mulheres (razão de sexos homem-mulher de 0,9). Encontrou-se preponderância absoluta de pacientes que nasceram em Miracema ou municípios vizinhos (94%), moravam em Miracema (90,7%), eram solteiros (70,8%), atribuíam a aquisição da infecção ao contato heterossexual desprotegido (72,3%) e tinham antecedentes de uso de cocaína inalada (27,7%). Desordens do sistema nervoso central (incluindo cinco casos de neurocriptococose) e insuficiência respiratória aguda semelhante à pneumocistose pulmonar foram as principais causas de morbidade. A maioria dos pacientes (56,9%) iniciou acompanhamento em estágios avançados de infecção pelo HIV.

Conclusões

A preponderância de pacientes em estágios avançados de infecção pelo HIV sugere a existência de um grande reservatório de casos não diagnosticados na comunidade. Uma característica marcante da casuística foi a inversão da razão de sexos homem-mulher. Investigações adicionais cobrindo áreas geográficas maiores são urgentemente necessárias para o melhor entendimento do espectro clínico e epidemiológico da infecção pelo HIV em pequenos municípios brasileiros e áreas rurais.

INTRODUCTION

The large urban centers in the Southeast macro-region of Brazil stand among the areas most heavily burdened by the HIV epidemic in the Americas. By June 2004 a total of 362,364 AIDS cases had been reported in Brazil⁷ and it was estimated that 597,000 15 to 49 year-old adults were living with HIV infection in the year 2000.¹⁷ Even though the Brazilian epidemic remains largely concentrated in major urban areas, enough evidence of rapidly changing epidemiological patterns is accumulating.

Current data on the Brazilian AIDS epidemic shows a trend towards an increasing number of cases in small municipalities.^{8,12,16} One study found a 4.1% annual increase in the incidence rate of male cases in the large cities of the Southeast macro-region between the years of 1990 and 1996; the corresponding figure for small southeastern municipalities was 20.8%.¹⁶ Consequently, to appropriately design and implement adequate control measures, a better understanding of the characteristics of HIV infection in relatively small Brazilian communities and rural areas is urgently needed. Thus, it was aimed at reporting the results of a clinical and epidemiological study performed in a small municipality.

METHODS

The study was carried out in Miracema a poor municipality in the northwestern area of the state of Rio de Janeiro, Brazil, located 276 km far from the capital at the border of the state of Minas Gerais (Figure 1). It comprises an area of 301 km² and is located 138 m above sea level (21°24'50"S; 42°11'52"W). Besides an urban area, Miracema has two rural districts and there were 27,064 inhabitants in the year 2000.*

From June 1999 HIV-infected patients have been followed up by a local physician. Since July 1999 monthly medical visits have been offered at a local outpatient clinic and patients have been assessed by a physician from the city of Rio de Janeiro. Patients are referred to the local AIDS Program by local providers whenever HIV infection is diagnosed or suspected. Antiretroviral agents as well as treatment and prophylaxis of opportunistic infections are freely provided to patients, as part of the National AIDS Program of the Brazilian Ministry of Health. Blood samples for lymphocyte subset counts and HIV plasma viral load testing are regularly collected and sent to laboratories either in the capital of Rio de Janeiro or Minas Gerais. Important laboratory and clinical resources frequently needed in the setting of HIV-in-

*Instituto Brasileiro de Geografia e Estatística (IBGE). Censo Demográfico de 2000: características da população e dos domicílios: resultados do universo. Rio de Janeiro; 2001.

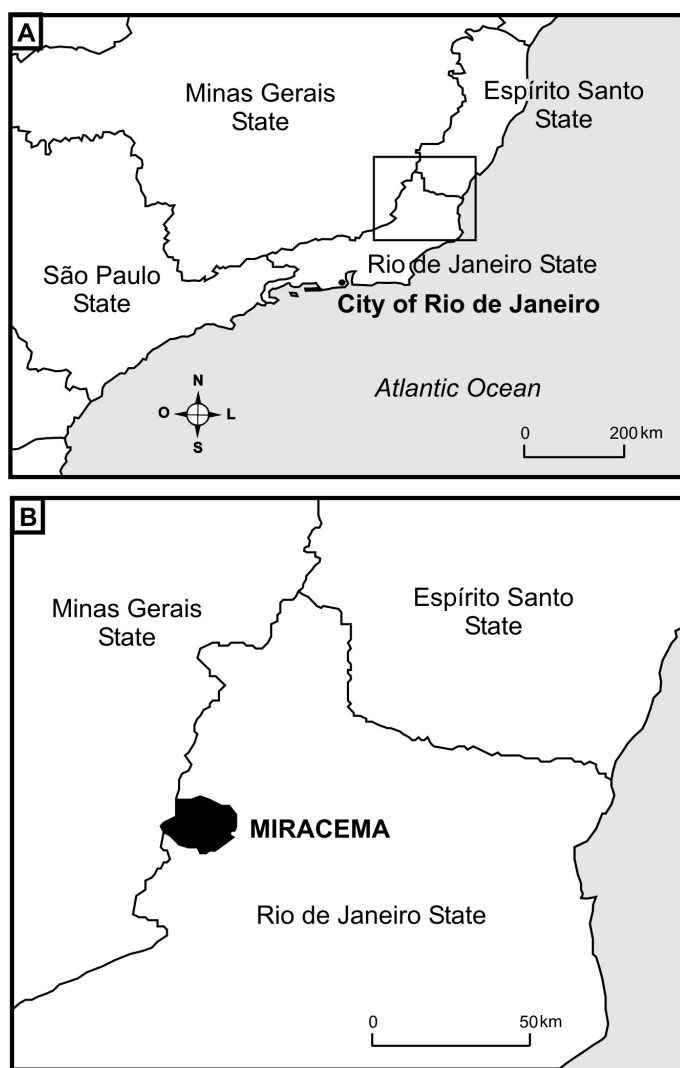


Figure 1 - (A) The Brazilian Southeast macro-region with its four component states; (B) The county of Miracema, in Northwestern area of the state of Rio de Janeiro, at the border of the state of Minas Gerais.

fection, such as fungal cultures, endoscopic procedures and neuroimaging studies, are not available in Miracema, and thus performed elsewhere. Pregnant women are offered HIV testing and counseling. Those diagnosed with HIV infection are offered vertical transmission prophylaxis.

After obtaining signed informed consent clinical and epidemiological characteristics were prospectively recorded of all HIV-infected adult patients who, at least once, attended the local AIDS Program between July 1999 and December 2003. The diagnosis of HIV infection was made based on the algorithm* proposed by the Brazilian Ministry of Health. Patients were staged according to the 1993 Revised Classification System for HIV Infection of the United States Centers for Disease Control and Prevention.⁹

Demographic data, the way of acquiring [HIV-infection, date of first reactive HIV testing, patterns of illicit drug use, educational level, clinical stage of HIV infection, date of AIDS diagnosis and HIV-related clinical conditions were recorded on standardized questionnaires. Demographic, social and behavioral data, as well as clinical stage, were recorded cross-sectionally as of first medical visit. The clinical stage was classified according to the Center for Disease Control (CDC) Classification. The study protocol was approved by the Ethics Review Board of the Instituto de Pesquisas Clínicas Evandro Chagas, Fundação Oswaldo Cruz, Rio de Janeiro.

RESULTS

Between July 1999 and December 2003 a total of 65 HIV-infected adult patients attended Miracema's AIDS Program (Figure 2). During the study period, two vertically HIV-infected children born elsewhere were also seen at the unit. The Table shows the demographic and epidemiological data according to gender. Most patients (34) were women and an overall 0.9 HIV-infected male to female ratio was recorded. For AIDS cases, a 1.1 male to female ratio was obtained. All but six patients lived in Miracema. Most (61) were born in Miracema or neighboring municipalities. A minority (23%) was married, divorced or reported living under consensual union. Most (69.2%) had none or less than eight years of education. Most patients (78.8% of whom information was available)

attributed the acquisition of HIV infection to unprotected heterosexual intercourse. One patient reported use of intravenous cocaine. In contrast, 16 out of 31 (51.6%) male patients referred past or current use of snorted cocaine. During the study period, seven HIV-infected pregnant women underwent vertical transmission prophylaxis successfully. At the moment, two other pregnant women, as well as two recently born children, are being followed up.

Most patients (56.9%) were diagnosed with AIDS (CDC stages C, A3 or B3) as of the first medical visit. HIV-related chronic wasting syndrome, anemia and oropharyngeal candidiasis were ubiquitous findings at presentation. Active tuberculosis (six cases), acute respiratory failure clinically and radiographically suggestive of pulmonary pneumocystosis (seven

*Ministério da Saúde. Diagnóstico sorológico da infecção pelo HIV. Comentários sobre a Portaria nº 488/98. Brasília (DF); 1998. Available from URL: www.aids.gov.br/fluxog.htm [25 out 2005]

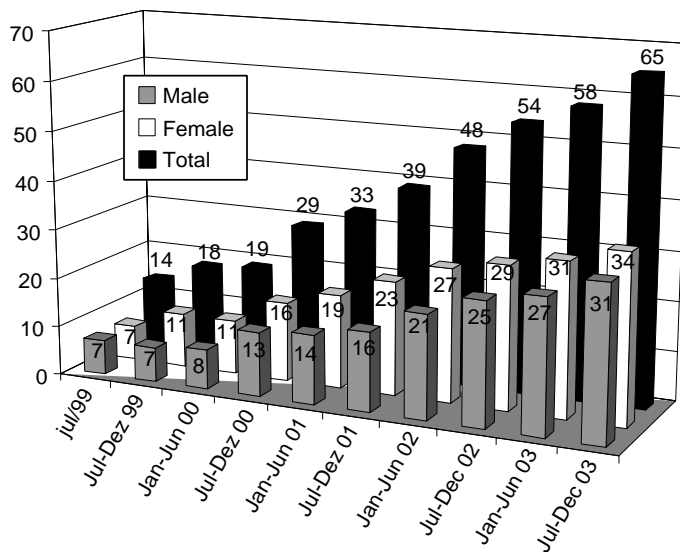


Figure 2 - Cumulative number of male and female HIV-infected patients. Miracema, Southeastern Brazil, July 1999 to December 2003.

cases) and focal central nervous system toxoplasmic encephalitis-like conditions (seven cases) were important AIDS-related infectious complications. A total of five cases (14.7% of the CDC stage C patients) had cryptococcal meningitis. Isolated cases of toxoplasmic retinitis (two cases) and cytomegalovirus colitis (one case) and retinitis (one case) were also diagnosed. No cases of acute or chronic hepatitis B virus infection were observed. The only patient who attributed HIV infection to intravenous drug use was diagnosed with chronic hepatitis C virus infection. No cases of Kaposi's sarcoma, AIDS-related lymphoma or other HIV-related neoplasms were recorded.

Nine patients died during the study period. Seven deaths were due to acute conditions at presentation. These patients did not have time to benefit from antiretroviral therapy. Focal neurological toxoplasmic encephalitis-like conditions (four cases) and acute pulmonary pneumocystosis-like respiratory failure (two cases) were the main causes of death.

DISCUSSION

This study found an absolute predominance of heterosexual transmission and a slightly inverted male to female ratio of HIV infection in the municipality of Miracema. During the early years of the HIV epidemic in Brazil, AIDS was primarily a male disease and there was a 28:1 male to female ratio.⁶ Since then, a progressive decline in the male to female ratio has been seen. An ecological study¹⁶ found that among AIDS cases reported between 1993 and 1996 the male to female ratio was lower in small municipalities (2.8) than in large urban centers (3.4). Male partner death and migration before the study period may partly

explain the inverted male to female ratio in this study. Other studies will be important for understanding the current demographic profile of HIV infection in small Brazilian communities.

An important finding of the present study was that more than 90% of the patients were born and lived in Miracema or other neighboring municipalities (Table). A similar epidemiological pattern may currently exist in other neighboring municipalities of the region, even though most of them have no local AIDS program. A larger study covering a broader geographic area is urgently needed to appropriately estimate the magnitude of the problem. In fact, epidemiological data on HIV infection in small Brazilian municipalities may be largely conservative due to underreporting. A study¹⁸ conducted in the state of Rio de Janeiro found that 51.9% of all AIDS-related deaths between 1991 and 1995 have not been reported to the Ministry of Health.

Most patients were single, young adults with low level of education. The spread of the HIV epidemic among lower education as well as low-income population is one of the most prominent characteristics of the current Brazilian AIDS epidemic.^{3,13} In Western Uganda, a sentinel surveillance study among 15 to 24-year-old prenatal clinic attendees found that the declining HIV prevalence was stronger among those with a higher level of education.¹⁴ According to a cross-sectional population survey in four cities of sub-Saharan Africa, educational level was found to be a key determinant of condom use within non-spousal partnership.¹⁵ Whether a relatively lower level of education in small Brazilian municipalities and rural areas, when compared to better educational opportunities in large cities, is associated with a greater vulnerability to the acquisition of HIV infection is unknown and needs to be addressed in appropriately designed studies.

Past or current use of snorted cocaine, especially by male patients, was commonly reported. Only one patient in the study cohort reported previous use of injected cocaine. In fact, in the state of Rio de Janeiro, cocaine is more commonly used snorted than injected.² Previous history of alcohol abuse was also a common finding (data not shown). The role of alcohol and non-injected illicit drug use in unsafe sexual behavior is a matter that deserves due attention. Studies have shown the association of heterosexually acquired HIV infection with both alcohol¹ and non-injected forms of cocaine.¹¹ The role of local patterns of alcohol and illicit drug use in the spread of HIV infection in small Brazil-

Table - Demographic and epidemiological data of HIV-infected adult patients. Miracema municipality, Southeastern Brazil, July 1999 to December 2003.

Variables	Female (N=34)	Male (N=31)	Total (N=65)
Age (mean ± SD)	30.7±10.3	32.8±9.1	31.7±9.7
	N (%)	N (%)	N (%)
Age range (years)	16-60	19-63	16-63
≤20	2 (5.9%)	1 (3.2%)	3 (4.6%)
21-30	18 (53%)	12 (38.7%)	30 (46.2%)
31-40	9 (26.5%)	13 (41.9%)	22 (33.8%)
41-50	3 (8.7%)	3 (9.7%)	6 (9.2%)
>50	2 (5.9%)	2 (6.4%)	4 (6.2%)
Marital status*			
Single	24 (70.6%)	22 (71%)	46 (70.8%)
Married/divorced/consensual union	6 (17.6%)	9 (29%)	15 (23%)
Widower	4 (11.7%)	-	4 (6.2%)
Place of birth*			
Miracema	26 (76.5%)	28 (90.3%)	54 (83%)
Neighboring counties	5 (14.7%)	2 (6.4%)	7 (10.9%)
Other	3 (8.8%)	1 (3.2%)	4 (6.1%)
Place of residence*			
Miracema	32 (94.1%)	29 (93.5%)	61 (93.8%)
Neighboring counties	2 (5.9%)	2 (6.5%)	4 (6.2%)
Level of education*			
None	1 (2.9%)	5 (16.1%)	6 (9.2%)
≤8 year	23 (67.6%)	16 (51.6%)	39 (60%)
>8 year	9 (26.5%)	10 (32.3%)	19 (29.3%)
Not recorded	1 (2.9%)	-	1 (1.5%)
Exposure category*			
Heterosexual	33 (97%)	14 (45.2%)	47 (72.3%)
Homo/bisexual	-	12 (38.7%)	12 (18.4%)
Intravenous drug use	-	1 (3.2%)	1 (1.5%)
Not recorded	1 (3%)	4 (12.9%)	5 (7.7%)
CDC stage*			
A1	10 (29.4%)	6 (19.3%)	16 (24.6%)
A2, B1 or B2	7 (20.6%)	5 (16.1%)	12 (18.4%)
A3, B3 or C	17 (50%)	20 (64.5%)	37 (56.9%)
Inhaled cocaine use*			
Yes	2 (5.9%)	16 (51.6%)	18 (27.7%)
No	29 (85.3%)	11 (35.5%)	40 (61.5%)
Not recorded	3 (8.8%)	4 (12.9%)	7 (10.8%)

CDC: Center for Disease Control and Prevention

ian communities where these problems are common remains largely an unexplored issue.

More than half of the patients (36 out of 65) first presented in advanced stages of HIV-disease (CDC stages C, A3 or B3). These cases show the frequent occurrence of HIV infection in subjects who were not aware of their HIV status or not willing to get medical treatment. Seven of these patients died without having the opportunity to benefit from antiretroviral therapy, which is freely provided to patients in Brazil. In conjunction, these figures are suggestive of a large pool of undiagnosed HIV infection in the community and highlight the need for appropriate studies on the prevalence of HIV infection in small Brazilian municipalities and rural areas.

Cryptococcal meningitis seemed to be a relatively common cause of morbidity in Miracema. Even though this fungal disease is not an uncommon complication of AIDS in Brazil, it has been reported in 4.4% AIDS patients at the time of reporting⁵ and in 6% of the cases studied in a large autopsy series.* In the present study, five out of 33 (14.7%) patients on CDC stage C developed cryptococcal meningitis,

most of them (four cases) as its presenting manifestation. It is not known whether immunosuppressed patients living in rural areas of Brazil are more likely to develop cryptococcal meningitis due to greater chances of environmental exposure to this fungal agent. Sharp geographic differences in the occurrence of infectious complications, including cryptococcal meningitis, have been found elsewhere when neighboring countries⁴ and neighboring regions within the same country¹⁰ were compared.

Small Brazilian municipalities are experiencing a fast growing AIDS epidemic, yet little data on the characteristics of HIV infection in these settings is available. The epidemic spread towards the innermost parts of the country will likely pose a variety of medical, social and logistic challenges. These settings generally have a much less comprehensive health infrastructure and lack physicians with expertise in the management of HIV infection and AIDS. Risk-reduction messages and campaigns may need to be redesigned to meet local epidemiological and social characteristics.

The spectrum and frequency of HIV-related clinical conditions may differ when compared to large

*Basílio-de-Oliveira CA. Infecções oportunistas pulmonares em necropsias na síndrome de imunodeficiência adquirida. Rio de Janeiro: Academia Nacional de Medicina; 1997.

urban settings. Confidentiality issues in small communities may pose barriers to HIV testing and treatment. The misleading opinion that HIV infection is a problem only in large urban centers may further increase local vulnerability. In a country where rural or predominantly rural municipalities are frequently misclassified as urban areas,^{19,20} patients from rural communities may be underrepresented in national reporting databases and, consequently, little atten-

tion may be directed to these areas. Patients from these areas are also less likely to benefit from the support of non-governmental organizations.

Investigations on the clinical and epidemiological characteristics of HIV infection in small Brazilian municipalities are thus urgently needed in order to design control strategies to halt epidemic spread, better allocate resources, and improve medical care.

REFERENCES

1. Auvert B, Ballard R, Campbell C, Carael M, Carton M, Fehler G, et al. HIV infection among youth in a South African mining town is associated with herpes simplex virus-2 seropositivity and sexual behaviour. *AIDS* 2001;15(7):885-98.
2. Bastos FI, Strathdee AS, Derrico M, Pina MF. Drug use and the spread of HIV/AIDS in South America and the Caribbean. *Drugs Educ Prev Policy* 1999;6(1):29-49.
3. Bastos FI, Szwarcwald CL. AIDS e pauperização: principais conceitos e evidências empíricas. *Cad Saúde Pública* 2000;16 Supl 1:65-76.
4. Blaxhult A, Kirk O, Pedersen C, Dietrich M, Barton SE, Gatell JM, et al. Regional differences in presentation of AIDS in Europe. *Epidemiol Infect* 2000;125(1):143-51.
5. Bol Epidemiol AIDS. Ministério da Saúde. Brasília (DF) 2000;13(1).
6. Bol Epidemiol AIDS. Ministério da Saúde. Brasília (DF) 2000;13(3).
7. Bol Epidemiol AIDS. Ministério da Saúde. Brasília (DF) 2005;18(1).
8. Brito AM, Castilho EA, Szwarcwald CL. AIDS e infecção pelo HIV no Brasil: uma epidemia multifacetada. *Rev Soc Bras Med Trop* 2001;34(2):207-17.
9. Centers for Disease Control and Prevention (CDC). 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. *MMWR Recomm Rep* 1992;41:1-19.
10. Chariyalertsak S, Sirisanthana T, Saengwonloey O, Nelson KE. Clinical presentation and risk behaviors of patients with acquired immunodeficiency syndrome in Thailand, 1994-1998: regional variation and temporal trends. *Clin Infect Dis* 2001;32(6):955-62.
11. Chiasson MA, Stoneburner RL, Hildebrandt DS, Ewing WE, Telzak EE, Jaffe HW. Heterosexual transmission of HIV-1 associated with the use of smokable freebase cocaine (crack). *AIDS* 1991;5(9):1121-6.
12. Dhália C, Barreira D, Castilho EA. A Aids no Brasil: situação atual e tendências. *Bol Epidemiol AIDS* 2000;13(1):25-33.
13. Fonseca MG, Bastos FI, Derrico M, Andrade CLT, Travassos C, Szwarcwald CL. AIDS e grau de escolaridade no Brasil: evolução temporal de 1986 a 1996. *Cad Saúde Pública* 2000;16 Supl 1:77-87.
14. Kilian AH, Gregson S, Ndyabangi B, Walusaga K, Kipp W, Sahlmuller G, et al. Reductions in risk behaviour provide the most consistent explanation for declining HIV-1 prevalence in Uganda. *AIDS* 1999;13(3):391-8.
15. Lagarde E, Carael M, Glynn JR, Kanhonou L, Abega SC, Kahindo M, et al. Educational level is associated with condom use within non-spousal partnerships in four cities of sub-Saharan Africa. *AIDS* 2001;15(11):1399-408.
16. Szwarcwald CL, Bastos FI, Esteves MA, de Andrade CL. A disseminação da epidemia da AIDS no Brasil, no período de 1987-1996: uma análise espacial. *Cad Saúde Pública* 2000;16 Supl 1:7-19.
17. Szwarcwald CL, Carvalho MF. Estimativa do número de indivíduos de 15 a 49 anos infectados pelo HIV, Brasil, 2000. *Bol Epidemiol AIDS* 2001;14(1):35-40.
18. Valente de Lemos KR, Valente JG. A declaração de óbito como indicador de sub-registro de casos de AIDS. *Cad Saúde Pública* 2001;17(3):617-26.
19. Veiga JE. O Brasil rural ainda não encontrou seu eixo de desenvolvimento. *Estud Av* 2001;43:101-19.
20. Veiga JE. Nem tudo é urbano. *Ciênc Cult* (São Paulo) 2004;56:26-9.