



HAL
open science

**Psychosocial correlates of inconsistent condom use
among HIVinfected patients enrolled in a structured
ART interruptions trial in Co[^]te d'Ivoire: results from
the TRIVACAN trial (ANRS 1269)**

Camelia Protopopescu, Fabienne Marcellin, Marie Preau, Delphine Gabillard,
Raoul Moh, Albert Minga, Amani Anzian, Maria Patrizia Carrieri, Christine
Danel, Bruno Spire

► **To cite this version:**

Camelia Protopopescu, Fabienne Marcellin, Marie Preau, Delphine Gabillard, Raoul Moh, et al..
Psychosocial correlates of inconsistent condom use among HIVinfected patients enrolled in a structured
ART interruptions trial in Co[^]te d'Ivoire: results from the TRIVACAN trial (ANRS 1269). Tropical
Medicine and International Health, 2010, 10.1111/j.1365-3156.2010.02524.x . halshs-01563595

HAL Id: halshs-01563595

<https://shs.hal.science/halshs-01563595v1>

Submitted on 17 Jul 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/43072546>

Psychosocial correlates of inconsistent condom use among HIV-infected patients enrolled in a structured ART...

Article in *Tropical Medicine & International Health* · March 2010

DOI: 10.1111/j.1365-3156.2010.02524.x · Source: PubMed

CITATIONS

14

READS

46

10 authors, including:



Fabienne Marcellin

French Institute of Health and Medical Resea...

70 PUBLICATIONS 825 CITATIONS

SEE PROFILE



Marie Préau

Université Lumière Lyon 2

155 PUBLICATIONS 1,121 CITATIONS

SEE PROFILE



Albert Minga

Programme PAC-CI, site ANRS, Abidjan, Côte ...

61 PUBLICATIONS 1,342 CITATIONS

SEE PROFILE



Christine Danel

ANRS - Agence Nationale de Recherche sur le...

73 PUBLICATIONS 1,391 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



DOD-CI ANRS 12323 [View project](#)



ANRS-Ipergay [View project](#)

Short Communication

Psychosocial correlates of inconsistent condom use among HIV-infected patients enrolled in a structured ART interruptions trial in Côte d'Ivoire: results from the TRIVACAN trial (ANRS 1269)

Camelia Protopopescu^{1,2,3}, Fabienne Marcellin^{1,2,3}, Marie Préau^{1,3,4}, Delphine Gabillard^{5,6}, Raoul Moh^{5,6}, Albert Minga^{5,6}, Amani Anzian^{5,6}, Maria Patrizia Carrieri^{1,2,3}, Christine Danel^{5,6} and Bruno Spire^{1,2,3}

1 INSERM, U912, Marseille, France

2 Université Aix Marseille, IRD, UMR-S912, Marseille, France

3 ORS PACA, Observatoire Régional de la Santé Provence Alpes Côte d'Azur, Marseille, France

4 Laboratoire de Psychologie, LabéCD, Université de Nantes, Nantes, France

5 Programme PACCI, Abidjan, Côte d'Ivoire

6 INSERM, U897, Bordeaux, France

Summary

OBJECTIVE To investigate the relationship between unsafe sexual behaviours and poor self-perceived health among people living with HIV and AIDS (PLWHA) in western Africa.

METHODS In March 2006, a survey was conducted among patients continuing their participation in the TRIVACAN trial (ANRS 1269) in Côte d'Ivoire, in which patients had been randomized to either continuous or interrupted antiretroviral therapy (ART) (2-months-off/4-months-on cycles [2/4-ART]) after 6–18 months of continuous ART (C-ART). Socio-demographic and psychosocial information, including data on sexual behaviours during the previous 6 months, was collected using face-to-face interviews. Sexually active patients with either a steady partner (serodiscordant or of unknown HIV status) or casual partners were considered to have unsafe sexual behaviours if they reported inconsistent condom use (ICU).

RESULTS Seventy-seven of the 192 patients reported ICU. In multivariate logistic regression, men were significantly less likely to report ICU than women (OR [95% CI] = 0.45 [0.20–0.98]). After adjustment for educational level and reduced sexual activity since ART initiation, concealment of HIV status (2.08 [1.02–4.25]) and poor self-perceived health (2.32 [0.97–5.52]) were independently associated with ICU.

CONCLUSION HIV prevention strategies in resource-limited settings should take into account self-perceived health and difficulties to disclose HIV status. Counselling interventions need to be developed to help PLWHA to adopt or negotiate safe behaviours respecting their individual cultures.

keywords unsafe sex, steady partner, casual partner, Africa

Introduction

Unsafe sexual behaviours remain the predominant mode of HIV transmission in sub-Saharan Africa (UNAIDS 2008). Few studies have analysed the determinants of such behaviours in poor-resource settings (Kiene *et al.* 2006; Bunnell *et al.* 2008), notably among patients initiating antiretroviral therapy (ART) (Moatti *et al.* 2003; Diabate *et al.* 2008). In addition, psychosocial correlates of unsafe sex have only been investigated in high-income countries (Vincent *et al.* 2004; Bouhnik *et al.* 2006). Data collected during the TRIVACAN

trial (ANRS 1269) of structured ART interruptions enabled us to investigate the relationship between unsafe sexual behaviours and poor self-perceived health among people living with HIV and AIDS (PLWHA) in Côte d'Ivoire.

Patients and methods

Study population

TRIVACAN (ANRS 1269) is a randomized trial of structured ART interruptions conducted in Abidjan, Côte

C. Protopopescu *et al.* **Inconsistent condom use in Côte d'Ivoire.**

d'Ivoire between 2002 and 2007 among 840 ART-naive HIV-infected adults (Danel *et al.* 2006). After 6–18 months of continuous treatment with zidovudine plus lamivudine plus either efavirenz (600 mg once a day) or indinavir (800 mg twice a day) as well as ritonavir (100 mg twice a day) (for HIV-2-infected patients, women refusing contraception, and women with a history of nevirapine prophylaxis), patients with CD4 count >350 cells/mm³ and plasma HIV RNA level <300 copies/ml were randomized into one of the three following strategies: continuous treatment (C-ART) ($n = 110$), 2-months-off/4-months-on treatment (2/4-ART) ($n = 325$) and CD4-guided treatment (CD4GT) ($n = 216$). In November 2005, the CD4GT strategy was prematurely stopped because of a higher severe morbidity rate than in the C-ART strategy, and patients randomized to CD4GT were prescribed continuous treatment.

In May–June 2006, a cross-sectional psychosocial survey was conducted among the 379 patients included in the C-ART and 2/4-ART arms ($n = 97$ and 282, respectively) who were still being followed up in the trial. During face-to-face interviews, these patients were asked a series of questions capturing socio-demographic and psychosocial data, including data about sexual activity.

Definition of unsafe sexual behaviours

Patients who reported not having used a condom at least once during the previous 6 months with either their steady partner (serodiscordant or of unknown HIV status) or casual partners were considered as reporting unsafe sexual behaviours, hereafter described as 'inconsistent condom use' (ICU).

Variables

Variables tested for their association with ICU included notably patient-reported symptoms during the previous 6 months (assessed using a list derived from the HIV symptom index (Justice *et al.* 2001)); self-perceived health status (assessed using a 5-point Likert scale: very poor, poor, average, good, very good) and depressive symptoms (as measured by a global score >16 obtained on the CES-D scale (Furher & Rouillon 1989)).

A perceived health index was calculated as follows: patients who reported having less than 12 symptoms (the mean number of symptoms reported by study patients during the previous 6 months) and who perceived their health status as 'very good' were considered as having 'good' self-perceived health, while the others were considered as having 'poor' self-perceived health.

Statistical analyses

Logistic regression models were used to identify factors associated with ICU. Factors with a P -value <0.25 in univariate models were considered eligible for multivariate analysis. A backward procedure was used to select significant factors for the final multivariate model (significance threshold $\alpha = 0.10$). Intercooled Stata 9.2 for Windows (StataCorp LP, College Station, TX, USA) software was used for all the analyses.

Results

Study population

Among the 379 participants in the psychosocial survey, 249 patients (65.7%) reported having a steady partner, while 60 (15.8%) reported having casual partners. Eighty-two percent of the latter reported having both steady and casual partners. A total of 237 patients (62.5%) reported sexual activity during the previous 6 months, with either their steady partner ($n = 177$), a casual partner ($n = 7$), or both ($n = 53$). We focused our analyses on the 192 of these patients (49 men and 143 women), hereafter described as the 'study population', who reported sexual activity with a serodiscordant steady or casual partner. Twenty-three percent of these patients reported that they concealed their HIV status and 15% could be considered as having a poor perceived health (Table 1).

Factors associated with ICU

Seventy-seven patients (40.1%) reported ICU, the majority being women (44.8% *vs.* 26.5% of men, χ^2 , $P = 0.025$). In the univariate analyses, women who did not report having used hormonal contraception during the previous 6 months were found to be at higher risk of ICU than men (Table 2). Low educational level and poor self-perceived health were also significantly associated with a higher risk of ICU.

No significant relationship was detected between ICU and age, matrimonial status, perception of moral support by family, frequency of sexual intercourse and reporting apprehension about having sex ($P > 0.25$). In the same way, treatment strategy (CT *vs.* 2/4-ART), treatment status at the time of the survey and HIV viral load at last assessment were not significantly associated with ICU. In the multivariate analysis, female gender, poor self-perceived health and concealment of HIV status were independent predictors of ICU, after adjustment for educational level and reduced sexual activity since ART initiation.

C. Protopopescu *et al.* **Inconsistent condom use in Côte d'Ivoire.****Table 1** Characteristics of the study population ($n = 192$; TRI-VACAN trial, ANRS 1269)

Variables	% of patients
Socio-economic characteristics	
Gender	
Female	74.5
Male	25.5
Age	
Mean (SD) – years	36.6 (7.4)
Matrimonial status	
Married or in a free union	58.8
Single, divorced or widowed	41.2
Educational level (basic literacy)	
Yes	78.6
No	21.4
Area of habitation	
Outside Abidjan	9.9
In Abidjan	90.1
Head of the household status	
No	59.4
Yes	40.6
Experience with HIV and ART	
Disclosure of seropositivity	
Disclosure to at least one person	77.1
Concealment	22.9
Ability to confide in someone about HIV-related problems	
No	37.5
Yes	62.5
Moral support by family	
Strong	40.6
Weak or non-existent	59.4
Moral support by friends or other close persons	
Strong	12.5
Weak or non-existent	87.5
Believing that ART eradicates HIV	
No	83.3
Yes	16.7
No. of symptoms reported*	
Median [IQR]	8 [3; 17]
Self-perception of health status	
Very poor	0
Poor	1.0
Average	12.5
Good	39.1
Very good	47.4
Perceived health index	
Good	84.9
Poor	15.1
Depressive symptoms	
CES-D† global score >16	
No	78.1
Yes	21.9
Sexual activity	
Frequency of sexual intercourse*	
Once a month or less	42.2
At least twice a month	57.8

Table 1 (Continued).

Variables	% of patients
Reduced sexual activity since ART initiation	
No	22.9
Yes	77.1
Apprehension about having sexual intercourse	
No	39.1
Yes	60.9
Use of hormonal contraception*	
Men	25.5
Women not using hormonal contraception	28.1
Women using hormonal contraception	46.4
Clinical and treatment-related characteristics	
Treatment arm	
2/4-ART	74.5
C-ART	25.5
ART regimen at randomization	
PI-based regimen	11.5
NNRTI-based regimen	88.5
Time since randomization	
Mean (SD) – months	26.4 (4.4)
On ART at the time of the survey	
No	23.4
Yes	76.6
HIV VL at last assessment‡	
Detectable	22.4
Undetectable	77.6

SD, standard deviation; ART, antiretroviral therapy; IQR, interquartile range [25%; 75%]; C-ART, continuous ART; 2/4-ART, 2-months-off/4-months-on ART cycles; PI, protease inhibitor; NNRTI, non-nucleoside reverse transcriptase inhibitor; VL, viral load.

*During the previous 6 months.

†Center for Epidemiological Studies Depression scale (Furber & Rouillon 1989).

‡Detectability threshold: 300 copies/ml.

Discussion

The present study in Côte d'Ivoire clearly shows that ICU is relatively frequent even among ART-treated patients, and that it concerns especially women, individuals concealing their HIV status, and individuals reporting poor self-perceived health.

Interestingly, no significant relationship was found between patients' report of ICU and the treatment strategy to which they were allocated or to their treatment status at the time of the survey. These results bring additional evidence about the absence of more frequent unsafe sexual behaviours while on ART (Crepaz *et al.* 2004). They may also be paralleled with the results of a recent Kenyan study underlining that psychosocial support plays a stronger role than treatment itself in creating favourable conditions for safe sexual behaviour (Sarna *et al.* 2008).

C. Protopopescu *et al.* **Inconsistent condom use in Côte d'Ivoire.****Table 2** Analysis of factors associated with unsafe sexual behaviours (*n* = 192; TRIVACAN trial, ANRS 1269)

Variables	Crude OR [95% CI]	<i>P</i> -value	Adjusted OR [95% CI]	<i>P</i> -value
Socio-economic characteristics				
Gender*				
Female (ref.)	1		1	
Male	0.44 [0.22; 0.91]	0.027	0.45 [0.20; 0.98]	0.045
Age – years	0.99 [0.95; 1.03]	0.699		
Matrimonial status				
Married or in a free union (ref.)	1			
Single, divorced or widowed	0.86 [0.48; 1.55]	0.616		
Educational level (basic literacy)*				
Yes (ref.)	1		1	
No	2.97 [1.46; 6.07]	0.0027	2.48 [1.16; 5.31]	0.020
Area of habitation				
Outside Abidjan (ref.)	1			
In Abidjan	2.74 [0.87; 8.61]	0.085		
Head of the household status*				
No (ref.)	1			
Yes	0.62 [0.34; 1.12]	0.115		
Experience with HIV and ART				
Disclosure of seropositivity*				
Disclosure to at least one person (ref.)	1		1	
Concealment	1.69 [0.86; 3.34]	0.130	2.08 [1.02; 4.25]	0.045
Ability to confide in someone about HIV-related problems				
No (ref.)	1			
Yes	0.62 [0.34; 1.13]	0.121		
Moral support by family				
Strong (ref.)	1			
Weak or non-existent	1.35 [0.74; 2.44]	0.327		
Moral support by friends or other close persons*				
Strong (ref.)	1			
Weak or non-existent	2.20 [0.83; 5.83]	0.114		
Believing that ART eradicates HIV*				
No	1			
Yes	1.89 [0.88; 4.06]	0.104		
No. of symptoms reported†	1.01 [0.99; 1.03]	0.173		
Perceived health index*				
Good (ref.)	1		1	
Poor	2.43 [1.09; 5.45]	0.031	2.32 [0.97; 5.52]	0.058
Depressive symptoms				
CES-D‡ global score >16*				
No (ref.)	1			
Yes	1.68 [0.84; 3.35]	0.142		
Sexual activity				
Frequency of sexual intercourse†				
Once a month or less	1			
At least twice a month	1.37 [0.76; 2.47]	0.301		
Reduced sexual activity since ART initiation*				
No (ref.)	1		1	
Yes	0.52 [0.26; 1.04]	0.063	0.55 [0.28; 1.11]	0.097
Apprehension about having sex				
No (ref.)	1			
Yes	0.75 [0.41; 1.37]	0.355		
Use of hormonal contraception*,†				
Men (ref.)	1			
Women not using hormonal contraception	2.77 [1.21; 6.36]	0.016		

C. Protopopescu *et al.* **Inconsistent condom use in Côte d'Ivoire.****Table 2** (Continued).

Variables	Crude OR [95% CI]	P-value	Adjusted OR [95% CI]	P-value
Women using hormonal contraception	1.97 [0.92; 4.23]	0.082		
Clinical and treatment-related characteristics				
Treatment arm				
2/4 ART (ref.)	1			
CT	0.83 [0.42; 1.62]	0.578		
ART regimen at randomization*				
NNRTI-based regimen (ref.)	1			
PI-based regimen	2.39 [0.97; 5.93]	0.059		
On ART at the time of the survey				
No (ref.)	1			
Yes	1.46 [0.72; 2.95]	0.292		
HIV VL at last assessment§				
Undetectable (ref.)	1			
Detectable	0.85 [0.42; 1.72]	0.661		

OR, odds ratio; CI, confidence interval; ART, antiretroviral therapy; CT, continuous treatment; 2/4 ART, 2-months-off/4-months-on ART cycles; PI, protease inhibitor; NNRTI, non-nucleoside reverse transcriptase inhibitor; VL, viral load.

*Variables entered in the multivariate model.

†During the previous 6 months.

‡Center for Epidemiological Studies Depression scale (Furher & Rouillon 1989).

§Detectability threshold: 300 copies/ml.

Patients' perception of their health status was the only health-related factor found to be significantly associated with ICU. This echoes evidence from studies conducted in France among specific subpopulations of PLWHA with other indicators of perceived health, such as poor mental health-related quality of life among gay men (Bouhnik *et al.* 2006) and self-reported side effects among injecting drug users (Vincent *et al.* 2004).

Female gender was also found to be associated with ICU (Glass *et al.* 2004). It has long been observed that, in heterosexual relationships, women often prefer not to use condoms because of their emotional attachment to their partners (Fullilove *et al.* 1990; Maticka-Tyndale 1992). In addition, in many African countries, women's social status is closely related to their ability to have children (Caldwell *et al.* 1992; WHO 1994), with those without children facing disgrace and rejection (Desgrées du Loû & Ferry 2005; Criton & Fener 2007). The desire to have children to overcome social stigma may thus take precedence over the risk of infecting someone else with HIV (Moore & Oppong 2007). It is also possible that some women do not even consider using condoms in the context of steady partnerships (Moore & Oppong 2007). Finally, social phenomena such as cross-generational relationships with financial motivation must be taken into account. In such relationships, material gain, sexual gratification, emotional factors and recognition from peers often override concerns about the risk of sexually transmitted infections (Longfield *et al.* 2004).

The present study also shows that educational level has a significant impact on protective behaviours, as already observed in previous studies conducted in several sub-Saharan Africa countries (Lagarde *et al.* 2001; Zellner 2003; De Walque 2006). This could be explained by a higher efficacy of HIV prevention campaigns among educated populations (De Walque 2007). Individuals with a lower education level may also have more difficulties to negotiate condom use. However, it must be pointed out that the relationship between educational attainment level and HIV prevalence in developing countries is complex and changes from place to place and by stage of epidemic. Indeed, large studies in four areas in Africa showed an increased risk of HIV infection among the more educated (Hargreaves & Glynn 2002). In addition, a recent study in Tanzania (Hargreaves & Howe 2010) shows that HIV prevalence significantly decreased between 2003 and 2007 among people with primary or secondary education, while it remained stable among people with no education, which suggests that prevalent HIV infections in Tanzania are now concentrating among less educated groups.

Concealment of seropositivity was also associated with ICU, as already shown in South Africa among PLWHA in clinical care (Kiene *et al.* 2006), and in France among serodiscordant homosexual couples (Bouhnik *et al.* 2007). These findings underline the dilemma that PLWHA face between disclosing their HIV status to potential sexual

C. Protopopescu *et al.* **Inconsistent condom use in Côte d'Ivoire.**

partners and protecting these partners as well as themselves against infection or super infection (Schiltz & Sandfort 2000).

The present study is limited by its cross-sectional design, which prevents the possibility of exploring longitudinal changes in PLWHA's sexual behaviours. However, to our knowledge, it is the first study to document sexual behaviour in the context of planned ART interruptions in sub-Saharan Africa.

In conclusion, this study highlights the importance of social barriers to the use of condoms in sub-Saharan Africa, as well as the central role of individuals' experience with HIV disease, in terms of both perceived health and disclosure of HIV status to non-medical persons. Counselling interventions need to be developed with the help of patients' associations and healthcare or social workers to help PLWHA to adopt or negotiate safe behaviours respecting their individual cultures. Support should especially target women with actions helping them to find the balance between their needs for protection against HIV infection and their desire to have children, be it for personal or societal reasons.

Acknowledgements

Investigators

Clinical care in Abidjan, Côte d'Ivoire - Service des Maladies Infectieuses et Tropicales (SMIT): Emmanuel Bissagnene (Principal Investigator), Serge Eholie, Auguste Kadio, Gustave Nzunetu, Cyprien Rabe, Aristophane Tanon. Centre Intégré de Recherches Biocliniques d'Abidjan (CIRBA): Olivier Ba-Gomis, Henri Chenal, Charles Diby, Denise Hawerlander. Centre National de Transfusion Sanguine (CNTS): Lambert Dohoun, Charlotte Huet, Seidou Konate, Albert Minga, Abo Yao. Unité de Soins Ambulatoires et de Conseil (USAC): Constance Kanga, Jonas Séri, Calixte Guéhi. Centre de Prise en Charge et de Formation (CePRéF): Amani Anzian, Mamadou Diarrasouba, Nicole Dakoury-Dogbo, Joachim Gnokoro, Eugène Messou, Catherine Seyler, Siaka Toure.

Biology

Centre de Diagnostic et de Recherches sur le SIDA (CeDReS), CHU de Treichville, Abidjan, Côte d'Ivoire: Dominique Bonard (mycobacteriologist), Arlette Emieme (trial monitor), André Inwolé (immunologist), Hervé Menan (parasitologist), Timothée Ouassa (bacteriologist), François Rouet (virologist), Thomas-d'Aquin Toni (virologist), Ramatou Toure (trial monitor). Service de Virologie, CHU Necker, Paris, France: Marie-Laure Chaix (virologist), Christine Rouzioux (virologist). Service de Pharmacologie Clinique, CHU Bichat Claude-Bernard, Paris, France: Gilles Peytavin (pharmacologist).

Trial coordination team

Abidjan, Côte d'Ivoire - Programme PACCI: Christine Danel (Coordinator), Romuald Konan (trial pharmacist), Raoul Moh (trial monitor), Delphine Sauvageot (trial monitor), Souleymane Sorho (data manager). Bordeaux, France - INSERM U593: Xavier Anglaret (Coordinator), Delphine Gabillard (trial statistician), Yves-Antoine Flori (economist), Roger Salamon (Principal Investigator).

Steering Committee

Françoise Barré-Sinoussi, François Boué, Geneviève Chêne, François Dabis, Pierre Marie Girard, Catherine Leport, Yves Souteyrand.

Independent Data Safety Monitoring Board

Dominique Costagliola (independent statistician), Daniel Sereni, Nicolas Meda, Thérèse N'Dri-Yoman, Philippe van de Perre. Representatives of the French Agence Nationale de Recherches sur le SIDA (ANRS, Paris, France) Brigitte Bazin, SÖverine Blesson, Chantal Canon, Jean-François Delfraissy

References

- Bouhnik AD, Preau M, Schiltz MA *et al.* (2006) Unsafe sex with casual partners and quality of life among HIV-infected gay men: evidence from a large representative sample of outpatients attending French hospitals (ANRS-EN12-VESPA). *Journal of Acquired Immune Deficiency Syndromes* **42**, 597–603.
- Bouhnik AD, Preau M, Schiltz MA, Lert F, Obadia Y & Spire B (2007) Unprotected sex in regular partnerships among homosexual men living with HIV: a comparison between sero-nonconcordant and seroconcordant couples (ANRS-EN12-VESPA Study). *AIDS* **21**(Suppl. 1), S43–S48.
- Bunnell R, Opio A, Musinguzi J *et al.* (2008) HIV transmission risk behavior among HIV-infected adults in Uganda: results of a nationally representative survey. *AIDS* **22**, 617–624.
- Caldwell JC, Caldwell P & Orubuloye IO (1992) The family and sexual networking in sub-Saharan Africa: historical regional differences and present-day implications. *Population Studies* **46**, 385–410.
- Crepaz N, Hart TA & Marks G (2004) Highly active antiretroviral therapy and sexual risk behavior: a meta-analytic review. *JAMA* **292**, 224–236.
- Criton C & Fener P (2007) *La sexualité et la grossesse de la femme confrontée au VIH/sida. Dossiers de synthèse Femmes et SIDA*. INIST-CNRS.
- Danel C, Moh R, Minga A *et al.* (2006) CD4-guided structured antiretroviral treatment interruption strategy in HIV-infected adults in west Africa (Trivacan ANRS 1269 trial): a randomised trial. *Lancet* **367**, 1981–1989.
- De Walque D (2006). *Who Gets AIDS and How? – The Determinants of HIV Infection and Sexual Behaviors in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania*. Development Research Group, The World Bank, Washington, DC.
- De Walque D (2007) How does the impact of an HIV/AIDS information campaign vary with educational attainment?

C. Protopopescu *et al.* **Inconsistent condom use in Côte d'Ivoire.**

- Evidence from rural Uganda *Journal of Development Economics* **84**, 686–714.
- Desgrées du Loû A & Ferry B (2005) Sexualité et procréation face aux risques du Sida – Permanences et adaptations dans les pays fortement touchés par l'épidémie. *La Chronique CEPED* **49**.
- Diabate S, Alary M & Koffi CK (2008) Short-term increase in unsafe sexual behaviour after initiation of HAART in Cote d'Ivoire. *AIDS* **22**, 154–156.
- Fullilove MT, Fullilove RE, Haynes K & Gross S (1990) Black women and AIDS prevention: a view toward understanding the gender rules. *Journal of Sex Research* **27**, 47–54.
- Furher R & Rouillon F (1989) La version française de l'échelle CES-D. Description and translation of the auto-evaluation (in French). *Psychiatrie et Psychobiologie* **4**, 163–166.
- Glass TR, Young J, Vernazza PL *et al.* (2004) Is unsafe sexual behaviour increasing among HIV-infected individuals? *AIDS* **18**, 1707–1714.
- Hargreaves JR & Glynn JR (2002) Educational attainment and HIV-1 infection in developing countries: a systematic review. *Tropical Medicine and International Health* **7**, 489–498.
- Hargreaves JR & Howe LD (2010) Changes in HIV prevalence among differently educated groups in Tanzania between 2003 and 2007. *AIDS* [Epub ahead of print].
- Justice AC, Holmes W, Gifford AL *et al.* (2001) Development and validation of a self-completed HIV symptom index. *Journal of Clinical Epidemiology* **54** (Suppl. 1), S77–S90.
- Kiene SM, Christie S, Cornman DH *et al.* (2006) Sexual risk behaviour among HIV-positive individuals in clinical care in urban KwaZulu-Natal, South Africa. *AIDS* **20**, 1781–1784.
- Lagarde E, Carael M, Glynn JR *et al.* (2001) Educational level is associated with condom use within non-spousal partnerships in four cities of sub-Saharan Africa. *AIDS* **15**, 1399–1408.
- Longfield K, Glick A, Waithaka M & Berman J (2004) Relationships between older men and younger women: implications for STIs/HIV in Kenya. *Studies in Family Planning* **35**, 125–134.
- Maticka-Tyndale E (1992) Social construction of HIV transmission and prevention among heterosexual young adults. *Social Problems* **39**, 238–251.
- Moatti JP, Prudhomme J, Traore DC, Juillet-Amari A, Akribi HA & Msellati P (2003) Access to antiretroviral treatment and sexual behaviours of HIV-infected patients aware of their serostatus in Cote d'Ivoire. *AIDS* **17** (Suppl. 3), S69–S77.
- Moore AR & Oppong J (2007) Sexual risk behavior among people living with HIV/AIDS in Togo. *Social Science and Medicine* **64**(5), 1057–1066.
- Sarna A, Luchters SM, Geibel S *et al.* (2008) Sexual risk behaviour and HAART: a comparative study of HIV-infected persons on HAART and on preventive therapy in Kenya. *International Journal of STD and AIDS* **19**, 85–89.
- Schiltz MA & Sandfort TG (2000) HIV-positive people, risk and sexual behaviour. *Social Science and Medicine* **50**, 1571–1588.
- UNAIDS (2008) Report on the global AIDS epidemic. WHO-UNAIDS.
- Vincent E, Bouhnik AD, Carrieri MP *et al.* (2004) Impact of HAART-related side effects on unsafe sexual behaviours in HIV-infected injecting drug users: 7-year follow up. *AIDS* **18**(9), 1321–1325.
- WHO (1994) *Women, sex and AIDS. AIDS: Images of the Epidemic*. World Health Organization, Geneva, pp. 56–61.
- Zellner SL (2003) Condom use and the accuracy of AIDS knowledge in Cote d'Ivoire. *International Family Planning Perspectives* **29**(1), 41–47.

Corresponding Author Fabienne Marcellin, INSERM UMR 912/ORS PACA, 23 rue Stanislas Torrents, 13006 Marseille, France. Tel.: +33 4 96 10 28 79; Fax: +33 4 96 10 28 99; E-mail: fabienne.marcellin@inserm.fr