

Men who have sex with men and HIV/AIDS in sub-Saharan Africa

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Globally, men who have sex with men (MSM) continue to bear a high burden of HIV infection. In sub-Saharan Africa, same-sex behaviours have been largely neglected by HIV research up to now. The results from recent studies, however, indicate the widespread existence of MSM groups across Africa, and high rates of HIV infection, HIV risk behaviour, and evidence of behavioural links between MSM and heterosexual networks have been reported. Yet most African MSM have no safe access to relevant HIV/AIDS information and services, and many African states have not begun to recognise or address the needs of these men in the context of national HIV/AIDS prevention and control programmes. The HIV/AIDS community now has considerable challenges in clarifying and addressing the needs of MSM in sub-Saharan Africa; homosexuality is illegal in most countries, and political and social hostility are endemic. An effective response to HIV/AIDS requires improved strategic information about all risk groups, including MSM. The belated response to MSM with HIV infection needs rapid and sustained national and international commitment to the development of appropriate interventions and action to reduce structural and social barriers to make these accessible.

Introduction

HIV/AIDS was first identified among men who have sex with men (MSM) in the USA in the early 1980s.¹ These individuals continue to bear a high burden of HIV in many countries, and are an important target population for the public health response to HIV/AIDS. By contrast, in sub-Saharan Africa, where the most devastating HIV epidemics have been recorded, MSM have been largely overlooked in HIV research and are absent from most national and regional public health responses.

The UNAIDS report draws attention to the global failure to understand and respond adequately to the human rights and public health needs of MSM.² This shortfall is most pronounced in sub-Saharan Africa where, in nearly every context, African MSM bear a considerably higher burden of HIV than do other men, and also draws attention to an unmet need for prevention, treatment, and care.^{3,4} As the health needs of African MSM are belatedly beginning to be recognised, we here investigate how HIV/AIDS in these individuals was overlooked, review what is known about their behaviours and risks in Africa today, and consider the priorities for the future of HIV/AIDS control with respect to MSM.

Cause of African HIV epidemics

The results from the earliest reports of an AIDS-like illness in central Africa in the early 1980s showed that men and women were equally affected.^{5–7} The notion that the AIDS-causing agent could be heterosexually transmitted, and was the predominant transmission route in Africa was investigated in the initial studies. In early case series, and case-control and seroprevalence studies, African patients with HIV/AIDS generally did not report male-to-male sex or injection drug use, which were the high-risk behaviours seen in the USA and Europe.⁸ Instead, adult HIV risk in Africa was related to the number and frequency of change in heterosexual partnerships.⁹

Yet, while most participants in the early studies denied same-sex practice, some did not. In a review of African patients with HIV/AIDS diagnosed in Europe up to April, 1986, most had no conventional risk factor, whereas 6% of African male patients reported homosexual behaviour.¹⁰ Some researchers advised caution, citing insufficient data about homosexuality and anal intercourse, and the difficulty in gathering accurate behavioural information from African patients as caveats to the prevailing understanding of the epidemic.^{8,11} In practice, the model of bidirectional heterosexual HIV transmission in Africa quickly replaced the established understanding of epidemic dynamics elsewhere, and the possibility that MSM might feature within this model soon disappeared from discussion.^{8–10,12}

After more than two decades, complete comprehension of the dynamics of African HIV epidemics remains elusive, despite progress in clarification of the social, behavioural,

Search strategy and selection criteria

We searched Medline and Embase, electronic abstracts of international and regional HIV/AIDS meetings, and online UN/WHO HIV/AIDS reports up to May, 2009. We hand searched abstracts of HIV/AIDS meetings that were not available electronically, and reference lists of selected reports. Search terms included “Africa, south of the Sahara”, “HIV infection”, “men who have sex with men”, and “homosexuality”. We compiled a database of potential risk factors assessed in peer-reviewed studies of HIV risk in adult men, identified from Medline (1980–2007, no language restrictions) including the MeSH search terms “Africa, south of the Sahara”, “HIV infection”, “male”, “sexual behaviour”, and “risk factor”. The results of our search strategies were compared with existing reviews about related topics. When necessary, we attempted to contact authors to obtain further information.

	Year(s) of study	Recruitment	HIV-1 test method	HIV-1 prevalence (95% CI)	Sample size	Adult male (≥15 years) HIV-1 prevalence estimates (2007)*
Botswana						
Gaborone ³⁴	2008	Snowball referral†	Oral fluid	19.7% (14–28)	117	18.1%
Cote D'Ivoire³⁵						
	2006	NA	NA	18.5% (8–29)	54	2.9%
Ghana³⁶						
	2006	NA	NA	25%	NA	1.4%
Kenya						
Nairobi ²¹	2002–05	VCT (self-referral)	Blood	10.6% (9–13)	780	6.1%
Mombasa ³⁷	2005–06	Snowball referral†	Blood	24.5% (19–30)	285	..
Malawi						
Blantyre and Lilongwe ³⁴	2008	Snowball referral†	Oral fluid	21.4% (16–28)	201	9.6%
Mauritania³⁸						
	2007	NA	NA	19.0% (2–36)	21	1.2%
Namibia						
Windhoek ³⁴	2008	Snowball referral†	Oral fluid	12.4% (9–17)	218	10.8%
Nigeria						
Southwest cities ³⁹	2006	RDS§	Blood	13.4% (11–15)	1125	2.4%
Lagos, Kano, Cross River ⁴⁰	2007	RDS§	Blood	13.5% (11–16)	879	..
Senegal						
Dakar and two towns ⁴¹	2004	Snowball referral†	Blood	21.5% (18–25)	442	0.7%
Dakar and two towns ⁴²	2007	Snowball referral†	Blood	21.8% (18–25)	501	..
South Africa						
Gauteng, KwaZulu-Natal, western Cape ⁴³	2003–05	Mixed, including venue-based‡ and internet recruitment	Self-report	14.1% (12–17)	728	13.1%
Cape Town ³²	2007–08	Venue-based recruitment‡	Oral fluid	34.3% (23–45)	73	..
Cape Town ³²	2007–08	Venue-based recruitment‡	Oral fluid	10.4% (8–13)	540	..
Sudan						
Khartoum ⁴⁴	2005	Snowball referral†	Blood	9.3% (7–11)	713	1.0%
Khartoum ⁴⁵	2007	Snowball referral†	Blood	7.8% (5–10)	406	..
Tanzania						
Zanzibar ²¹	2007	RDS§	Blood	12.3% (10–15)	509	5.0%
Zambia ⁴⁶	2006	NA	Self-report	33% (29–37)	641	13.6%

NA=data not available. VCT=voluntary counselling and testing service. *National estimates of men 15 years or older living with HIV/AIDS (2007) from UNAIDS,⁴⁶ and national population estimates of men 15 years and older (2007) from US Census Bureau.⁴⁸ †Simple chain-referral sampling in which study participants recruit future participants from among their peers. ‡Participants recruited from locations where the target population congregates; this type of recruitment might represent a probability sample. §Respondent-driven sampling (RDS): an adaptation of snowball sampling in which recruitment is implemented to allow calculation of participant selection probabilities.

Table: Estimates of HIV prevalence from studies in sub-Saharan African men who have sex with men

and clinical determinants of individual and population risks.¹³ Strikingly absent from this research is any further assessment of the potential role of same-sex behaviours on these risks. Same-sex behaviour as a potentially relevant risk factor was measured in only 14 of 118 studies reported between 1984–2007 in which personal behavioural risk factors for contracting HIV-1 among sub-Saharan African men were assessed. In ten of these 14 studies, some men reporting MSM behaviour were identified.

Same-sex behaviour in African men

Reports about anthropology, by contrast, document sex between men across sub-Saharan Africa, both before and after the recognition of HIV. Descriptions of African same-sex behaviours are geographically

widespread, and the social contexts in which they occur are diverse.^{14,15} Relationships between men vary from status-differentiated partnerships (on the basis of differences in age or gender identity) to the egalitarian partnerships characteristic of the USA and Europe.¹⁶ Same-sex sexual experimentation before marriage or in adolescence has been reported,¹⁷ and in some areas male-to-male sex is a necessary component of certain traditional practices.¹⁸

These findings challenge any notion that the practices and identities of MSM are a recent occurrence in Africa. By contrast, this evidence confirms the occurrence of male same-sex behavioural practices, known to be potent risk factors for HIV transmission in every other geographic context, before and after the recognition of

HIV/AIDS in Africa. Although these findings suggest the need to carefully investigate the extent and relevance of MSM and same-sex behaviours in the context of HIV epidemics, there is little indication that such investigations have been done. Few studies provided data about the prevalence of male same-sex behaviour in the general population up to 2007: the Democratic Republic of Congo, none;¹⁹ Kenya, 0.03%²⁰ to 0.9%;²¹ South Africa, 0.06%²² to 3.6%;²³ and Tanzania 2.3%.²⁴ Additionally, the behaviours of MSM in specified populations (prisoners,²⁵⁻²⁷ truck drivers,²⁸ and individuals attending clinics for sexually transmitted infectious diseases^{29,30}) have been assessed in a few studies.

HIV risk and risk behaviours

Although little is known about the overall prevalence of male same-sex behaviours in African societies, the identification and characterisation of several MSM groups in Africa have been accompanied by an unprecedented surge in research activity and visible local and international advocacy movements in the past few years.² Cáceres and colleagues⁴ identified 14 studies of MSM populations from Senegal, Kenya, Nigeria, South Africa, Sudan, Zambia, Ghana, and Uganda during 2003–07. Further data from MSM populations in Zanzibar, Malawi, Botswana, Namibia, and South Africa were presented at the 2008 conference in Mexico^{31,32} and the 2009 conference in Canada.³³ Additionally, new studies are underway in Togo and Guinea-Bissau.

HIV prevalence among African MSM is generally considerably higher than among adult men in the general population (table). HIV incidence has as yet only been reported in MSM in Mombasa; most of these individuals were sex workers. HIV incidence in these men was high—8.8 per 100 person-years in those practicing insertive anal sex only, 12.9 per 100 person-years for receptive anal sex only, and 20.4 per 100 person-years for both insertive and receptive sex.³⁷ To what extent these few early data accurately indicate the true burden of HIV in the general MSM populations is uncertain. Although inadequacies and inconsistencies in study sample sizes, sampling methods, and HIV-testing protocols prohibit robust conclusions, they show the practical difficulties in engagement with hidden and highly stigmatised populations.

Important conclusions from behavioural studies of African MSM are that unprotected anal sex is commonplace,⁴ knowledge and access to appropriate risk prevention measures are inadequate,^{44,49,50} and that, in some contexts, many MSM engage in transactional sex.⁴ Stigma, violence, detention, and lack of safe social and health resources are widely reported.^{34,51-53}

Links with heterosexual HIV epidemics

MSM sexual networks might also be closely associated with predominantly heterosexual networks in the general population. The results of behavioural studies

have consistently shown that a high proportion of MSM also report recent female sexual partners, and many are married.⁴ In Kenya and Senegal, partners and clients of MSM are predominantly from local communities and only rarely international tourists.^{37,41}

The speculation that HIV transmission between MSM is not behaviourally segregated from transmission occurring among the general population is supported by viral genotype data.^{54,55} The results from early HIV genotype studies in white South African MSM indicated a predominance of subtype B, suggesting strong transmission links with American and western European MSM, and segregation from the local, heterosexual epidemic (subtype C).⁵⁶ By contrast, HIV subtypes in MSM of African origin resemble circulating strains within the local heterosexual population. In Kenya, MSM were mostly infected by the main HIV-1 subtype in the general population (pure subtype A); subtype B was not reported (13 samples).⁵⁴ In Senegal, although the distribution of subtypes differed between MSM (70 samples), female sex workers, and the general population, all subtypes were represented in each group.⁵⁵

National HIV/AIDS responses

The policy and programmatic responses to HIV prevention in the generalised epidemics in Africa have characteristically focused on interventions that target the predominant roles of heterosexual and mother-to-child transmission.⁵⁷ This response has benefited from improved population-level HIV and behavioural surveillance methods and data.^{58,59} However, these developments have occurred at the expense of surveillance and response to the burden of HIV in high-risk groups and their effect on local transmission, even when the evidence indicates that these groups exist (eg, female sex workers).⁶⁰

The need to better understand the local diversity of HIV burden and transmission is increasingly recognised, even in the context of generalised epidemics. Methods to estimate the proportion of new HIV infections attributable to different risk groups, including MSM, have been developed to inform local policy and resource allocation.^{61,62} In 2008, the core data requested from all UN member states reporting evidence of progress towards the Declaration of Commitment of the 2001 UN General Assembly Session of HIV/AIDS (UNGASS) included for the first time estimates of risk knowledge and behaviour, HIV prevalence, and access to care among MSM.⁶³ Indicative of the challenge ahead, 35 of 52 African countries were unable to report any information about MSM populations.⁶⁴ Notwithstanding the lack of reliable population data about African MSM, the proportion of current HIV incidence attributable to MSM is estimated to be as high as 20% in some west African countries based on models of the mode of transmission presented at the 2008 conference in Mexico.⁶⁵ Most African states have yet to allocate any

national HIV/AIDS resource for HIV/AIDS prevention or care for MSM.

The effectiveness of national HIV prevention programmes on HIV risk behaviour in MSM is not known but is likely to be low. Safe sex for MSM implies access to condoms and lubricants that are rarely available or are prohibitively expensive.⁶⁶ Messages about prevention targeted to heterosexual populations might seem irrelevant to MSM; African MSM might not consider same-sex encounters to be sex at all because this word can also infer reproduction.¹⁶ Perceptions that anal sex or sex between men pose no risk of HIV transmission, even that such behaviours might be actively sought because of this misconception, have been reported repeatedly.^{46,49} How widespread such misconceptions are is unclear, yet the almost complete absence of African media, health education, and counselling to challenge these beliefs is self-evident.

Barriers to prevention, treatment, and care

The neglect of research, surveillance and HIV prevention, and treatment and care programmes for MSM cannot be separated from the influence of general, largely hostile attitudes toward homosexuality in Africa. Male-to-male sex is illegal in 31 sub-Saharan African countries, potentially attracting the death penalty in four.⁶⁷ In recent years, governments of several countries have strengthened laws against homosexuality, and political and religious leaders have publicly denounced MSM as immoral and not deserving attention from the state. In the most recent Pew Global Attitudes Project survey, most respondents sampled from ten sub-Saharan African countries stated that society should reject homosexuality.⁶⁸

MSM who disclose their orientation, through choice or necessity, report family rejection, public humiliation, harassment by authorities, and ridicule by health-care workers.^{33,49,52} The consequences of stigma on HIV risk, and access to prevention and care for African MSM are unknown. Elsewhere, low self-esteem, and loss of family and community cohesion are thought to mediate an association between social oppression and sexual risk-taking behaviour.⁶⁹ African MSM might also be stigmatised in ways that differ from those elsewhere: Murray and Roscoe¹⁵ draw attention to the expectation of the production of children as a predominant social pressure on homosexual men in some African contexts.¹⁵

Political, cultural, and religious hostility towards MSM thus presents the main barrier to implementing effective HIV research, policy, and health programmes for African MSM. Successes in engagement with and delivery of the few interventions to known MSM are tempered with the recognition that many, probably most, MSM conceal their behaviour for fear of repercussion and remain beyond the reach of such interventions.^{37,66} Although since repealed, the widely condemned sentencing and imprisonment of nine activists involved in providing HIV prevention, care,

and treatment services to MSM in Senegal (one of few African countries with a national HIV programme targeting MSM) show the potential for political and religious sentiments to compete with HIV/AIDS control efforts.⁷⁰

Priorities for HIV policy and research in Africa

Building on recent progress

Notwithstanding the dire circumstances most African MSM presently endure, some cause for optimism exists. An unprecedented increase in research into MSM, evident at recent African and international HIV/AIDS conferences, is in progress. WHO held its first technical consultation about MSM, and the prevention and treatment of HIV consultation,^{2,71} and African HIV researchers, MSM advocates, and national AIDS programme managers met in Kenya and South Africa last year to exchange research findings, discuss national responses, and identify the surveillance, intervention, and research priorities for MSM. In May, 2009, the UN took an important first step in recognising the inadequacy of current responses for MSM, and in committing to improvement of their human rights, strengthening the evidence base for HIV interventions, and securing the governmental and non-governmental capacity and resources to implement interventions.² These first signals of international interest must now translate into sustained leadership to assure enduring responses to the shortfalls in HIV policy and research for African MSM.

Improvement of information

Even in countries where research activities have been most intense and policy makers have recognised the issue, few data about sociodemographic or sexual behaviour exist to inform targeted interventions. Sources of episodic (AIDS indicator surveys, sexual behaviour studies, and demographic and health surveys) and routine (voluntary counselling and testing) behavioural risk information should begin to provide basic information about same-sex practices, albeit mindful of the importance of validation of any new measures of same-sex behaviour in African contexts. MSM should also be directly engaged to assess risk behaviour, burden of HIV, and access to and acceptability of preventive and treatment services. Establishment of acceptable, valid, and generalisable surveillance and research methods to engage with MSM is a priority. Findings from population and risk-group surveillance should be used to directly inform national and regional HIV/AIDS priority setting and resource allocation.^{59,62}

Need for effective interventions

There is an urgent need to develop and implement appropriate HIV interventions for MSM in Africa. Successful behavioural and biomedical interventions for

MSM in other parts of the world need to be adapted and tested in the African contexts, and should be informed by new research. We need to better understand the determinants of MSM HIV risk and risk behaviour, including an appreciation of the range of sexual identities represented by African MSM, the personal, peer, and social norms that might have an effect on sexual behaviour, and the scale, variation, and interaction of MSM and non-MSM sexual networks.

Conversely, there is no justification for further delays in the provision of the basic elements of HIV risk reduction in MSM—ie, access to relevant information and counselling, condoms, water-based lubricants, prevention and treatment of sexually transmitted diseases, and HIV testing, treatment, and care—or to overlook the important need to sensitise and train those involved in HIV prevention. Risk reduction approaches will require a range of different service delivery models, governmental and non-governmental, the combination of which can enable safe and accessible HIV services to African MSM.

National commitment to universal access

An essential part of the challenge is the profound cultural, political, and religious oppression of MSM in most sub-Saharan countries. The few local policy makers and researchers who have attempted to investigate HIV epidemiology and service needs in MSM have done so against societal and professional convention, often at personal risk.^{70,72} A real danger exists that efforts to better understand the burden of HIV among African MSM and their role within the national epidemics might inadvertently increase social hostility towards MSM if such initiatives do not have African political commitment and ownership, or are separated from the broad social reforms for the recognition of sexual minorities in civil society. Structural interventions that encompass legal reforms and social protections for MSM and those who work with these men will be essential to enable and sustain effective national HIV/AIDS responses for MSM.⁷³

Conclusion

In the early 1980s, silence equals death became a rallying cry for MSM activists in the USA to draw attention to a frightening new disease that was largely ignored or denied by government officials and the general public. Nearly three decades later in sub-Saharan Africa the silence remains, driven by cultural, religious, and political unwillingness to accept MSM as equal members of society. And the effect of silence is the same; the continued denial of MSM from effective HIV/AIDS prevention and care is harmful to national HIV/AIDS responses, the consequence of which is borne not only by MSM, but by everyone. The challenge now is to break that silence, recognise the problem, and begin to move forward in the development and implementation of the prevention and care programmes that are so urgently needed.

Contributors

AS compiled literature reviews, wrote the first draft and finalised the Review. All authors conceptualised, reviewed, and edited the Review.

Conflicts of interest

We declare that we have no conflicts of interests.

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References

- 1 CDC. Pneumocystis pneumonia—Los Angeles. *MMWR* 1981; **30**: 250–52.
- 2 UNAIDS. UNAIDS Action Framework: universal access for men who have sex with men, and transgender people. Geneva, Switzerland: UNAIDS/UNDP, 2009.
- 3 Baral S, Sifakis K, Cleghorn F, Beyrer C. Elevated risk for HIV infection among men who have sex with men in low- and middle-income countries 2000–2006: a systematic review. *PLoS Med* 2007; **4**: e339.
- 4 Cáceres C, Konda K, Segura E, Lyerla R. Epidemiology of male same-sex behaviour and associated health indicators in low- and middle-income countries: 2003–2007 estimates. *Sex Transm Infect* 2008; **84**: i49–56.
- 5 Piot P, Taelman H, Bila K, et al. Acquired immunodeficiency syndrome in a heterosexual population in Zaire. *Lancet* 1984; **324**: 65–69.
- 6 Serwadda D, Swankambo NK, Carswell JW, et al. Slim disease: A new disease in Uganda and its association with HTLV-III infection. *Lancet* 1985; **326**: 849–52.
- 7 Van de Perre P, Lepage P, Kestelyn P, et al. Acquired immunodeficiency syndrome in Rwanda. *Lancet* 1984; **324**: 62–65.
- 8 Biggar RJ. The AIDS problem in Africa. *Lancet* 1986; **327**: 79–83.
- 9 Piot P, Carael M. Epidemiological and sociological aspects of HIV-infection in developing countries. *Br Med Bull* 1988; **44**: 68–88.
- 10 Quinn T, Mann J, Curran J, Piot P. AIDS in Africa: an epidemiologic paradigm. *Science* 1986; **234**: 955–63.
- 11 Hrdy D. Cultural practices contributing to the transmission of human immunodeficiency virus in Africa. *Rev Infect Dis* 1987; **9**: 1109–19.
- 12 Johnson A, Laga M. Heterosexual transmission of HIV. *AIDS* 1988; **2** (suppl 1): S49–56.
- 13 Auvert B, Buve A, Ferry B, et al. Ecological and individual level analysis of risk factors for HIV infection in four urban populations in sub-Saharan Africa with different levels of HIV infection. *AIDS* 2001; **15** (suppl 4): S15–30.
- 14 Epprecht M. Heterosexual Africa? The history of an idea from the age of exploration to the age of AIDS. Athens: Ohio University Press, 2008.
- 15 Murray S, Roscoe W. Boy-wives and female husbands. Studies of African homosexualities. New York: St Martin's Press, 1998.
- 16 Epprecht M. "Good God Almighty, What's this!" Homosexual crime in early colonial Zimbabwe. In: Murray S, Roscoe W, eds. Boy-wives and female husbands. Studies of African homosexualities. New York: St Martin's Press, 1998.
- 17 Wilson M. Good company: a study of Nyakyusa age-villages. London, New York: International African Institute, Oxford University Press, 1951.
- 18 Morgan R, Reid G. "I've got two men and one woman": Ancestors, sexuality and identity among same-sex identified women traditional healers in South Africa. *Cult Health Sex* 2003; **5**: 375–91.
- 19 Ryder RW, Ndilu M, Hassig SE, et al. Heterosexual transmission of HIV-1 among employees and their spouses at two large businesses in Zaire. *AIDS* 1990; **4**: 725–32.
- 20 Mattson CL, Bailey RC, Agot K, Ndinya-Achola JO, Moses S. A nested case-control study of sexual practices and risk factors for prevalent HIV-1 infection among young men in Kisumu, Kenya. *Sex Transm Dis* 2007; **34**: 731–36.

- 21 Angala P, Parkinson A, Kilonzo N, Natecho A, Taegtmeier M. Men who have sex with men (MSM) as presented in VCT data in Kenya. AIDS 2006–XVI International AIDS Conference; Toronto, ON, Canada; Aug 13–18, 2006: abstr MOPE0581.
- 22 Lane T, Pettifor A, Pascoe S, Fiamma A, Rees H. Heterosexual anal intercourse increases risk of HIV infection among young South African men. *AIDS* 2006; **20**: 123–25.
- 23 Jewkes R, Dunkle K, Nduna M, et al. Factors associated with HIV sero-positivity in young, rural South African men. *Int J Epidemiol* 2006; **35**: 1455–60.
- 24 Mwakagile D, Mmari E, Makwaya C, et al. Sexual behaviour among youths at high risk for HIV-1 infection in Dar es Salaam, Tanzania. *Sex Transm Infect* 2001; **77**: 255–59.
- 25 Chimphambano C, Komolafe O, Muula A. HIV prevalence among prison inmates in a central prison in Malawi, 2005. *Trop Doct* 2007; **37**: 226–28.
- 26 Simooya O, Sanjobo N, Kaetano L, et al. 'Behind walls': a study of HIV risk behaviours and seroprevalence in prisons in Zambia. *AIDS* 2001; **15**: 1741–44.
- 27 Adeji A, Armah H, Gbagbo F, et al. Correlates of HIV, HBV, HCV and syphilis infections among prison inmates and officers in Ghana: A national multicenter study. *BMC Infect Dis* 2008; published online March 7. DOI:10.1186/1471-2334-8-33.
- 28 Mbugua GG, Muthami LN, Mutura CW, et al. Epidemiology of HIV infection among long distance truck drivers in Kenya. *East Afr Med J* 1995; **72**: 515–18.
- 29 Diallo MO, Ackah AN, Lafontaine MF, et al. HIV-1 and HIV-2 infections in men attending sexually transmitted disease clinics in Abidjan, Côte d'Ivoire. *AIDS* 1992; **6**: 581–85.
- 30 Simonsen JN, Cameron DW, Gakinya MN, et al. Human immunodeficiency virus infection among men with sexually transmitted diseases. Experience from a center in Africa. *N Engl J Med* 1988; **319**: 274–78.
- 31 Johnston L, Dahoma M, Holman A, et al. HIV infection and risk factors among men who have sex with men in Zanzibar (Ugungu). AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008: abstr A-072-0201-12080.
- 32 Burrell E, Mark D, Baral S, et al. Comparison of sexual risk behaviors and HIV prevalence between urban and peri-urban men who have sex with men (MSM) in Cape Town, South Africa. http://www.msmandhiv.org/documents/inv_post_capetown.pdf (accessed July 1, 2009).
- 33 Beyrer C, Trapence G, Motimedi F, et al. Sexual concurrency, bisexual practices, and HIV among men who have sex with men: Malawi, Namibia, and Botswana. 16th Conference on Retroviruses and Opportunistic Infections; Montreal, QC, Canada 2009: abstr W-172.
- 34 Baral S, Trapence G, Motimedi F, et al. HIV prevalence, risks for HIV infection, and human rights among men who have sex with men (MSM) in Malawi, Namibia, Botswana. *PLoS One* 2009; **4**: e4997.
- 35 Rapport national de la Côte d'Ivoire. Republique de Côte D'Ivoire: Ministère de la lutte contre le SIDA, 2008.
- 36 Republic of Ghana. National report on the progress of the United Nations General Assembly Special Session (UNGASS) declaration of commitment of HIV and AIDS. Republic of Ghana: Ghana AIDS Commission, 2008.
- 37 Sanders EJ, Graham SM, Okuku HS, et al. HIV-1 infection in high risk men who have sex with men in Mombasa, Kenya. *AIDS* 2007; **21**: 2513–20.
- 38 Republique Islamique de Mauritanie. Report UNGASS 2008 de la Mauritanie. Republique Islamique de Mauritanie: Comité Nationale de lutte contre le SIDA, 2008.
- 39 Adebajo S, Myers T, Allman D, et al. HIV and sexually transmitted infections among men who have sex with men (MSM) in Nigeria. AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008: abstr A-072 - 0130-04898.
- 40 Federal Republic of Nigeria. HIV/STI integrated biological and behavioural surveillance survey (IBBS). Nigeria: Federal Ministry of Health, 2008.
- 41 Wade AS, Kane CT, Diallo PA, et al. HIV infection and sexually transmitted infections among men who have sex with men in Senegal. *AIDS* 2005; **19**: 2133–40.
- 42 Wade A, Larmarange J, Diop O, et al. Reduction of risk behaviours among MSM in Senegal after targeted prevention interventions. AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008: abstr A-072-0174-04197.
- 43 Sandfort T, Nel J, Rich E, Reddy V, Yi H. HIV testing and self-reported HIV status in South African men who have sex with men: results from a community-based survey. *Sex Transm Infect* 2008; **84**: 425–29.
- 44 Elrashied S. Prevalence, knowledge and related risky sexual behaviours of HIV/AIDS among receptive men who have sex with men (MSM) in Khartoum state, Sudan. AIDS 2006–XVI International AIDS Conference; Toronto, ON, Canada; August 13–18, 2006: abstr TUPE0509.
- 45 Elrashied S. HIV sero-prevalence and related risky sexual behaviours among insertive men having sex with men (IMSM) in Khartoum state, Sudan. 2007 AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008: abstr WEPE0750.
- 46 Zulu K, Bulawo N, Zulu W. Understanding HIV risk behaviour among men who have sex with men in Zambia. AIDS 2006–XVI International AIDS Conference; Toronto, ON, Canada; Aug 13–18, 2006: abstr WEPE0719.
- 47 UNAIDS. Report on the global AIDS epidemic. Geneva: UNAIDS, 2008. http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/2008_Global_report.asp (accessed July 1, 2009).
- 48 US Census Bureau. International Data Base (IDB). Suitland: US Census Bureau. <http://www.census.gov/ipc/www/idb/> (accessed July 1, 2009).
- 49 Geibel S, Luchters S, King'Ola N, Esu-Williams E, Rinyiru A, Tun W. Factors associated with self-reported unprotected anal sex among male sex workers in Mombasa, Kenya. *Sex Trans Dis* 2008; **35**: 746–52.
- 50 Umar E, Trapence G, Chibwezo W, et al. A cross-sectional evaluation of the HIV prevalence and HIV-related risk factors of men who have sex with men (MSM) in Malawi. AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008: abstr A-072-0130-10017.
- 51 Attipoe D. Revealing the Pandora box or playing the ostrich? A situational appraisal of men having sex with men in the accra metropolitan area and its environs—Ghana, 2004. http://www.thegully.com/essays/gaymundo/0403_gay-men_hiv_ghana/msm_ghana_intro_summary.html (accessed July 1, 2009).
- 52 Niang C, Tapsoba P, Weiss E, et al. 'It's raining stones': stigma, violence and HIV vulnerability among men who have sex with men in Dakar, Senegal. *Cult Health Sex* 2003; **5**: 499–512.
- 53 Onyango-Ouma W, Birungi H, Geibel S. Understanding the HIV/STI risks and prevention needs of men who have sex with men in Nairobi, Kenya. Washington: Population Council, 2005.
- 54 Tovanabutra S, Sanders EJ, Graham SM, et al. Comparative evaluation of HIV-1 strains in men having sex with men and in female sex workers in Mombasa, Kenya. 15th International Workshop on HIV Dynamics and Evolution, Santa Fe, NM, USA, 2008: 1. <http://cme.ucsd.edu/hivdynamics/AbstractBook2008.pdf> (accessed July 1, 2009).
- 55 Diop-Ndiaye H, Toure Kane C, Vidal N, et al. Surprisingly high prevalence of subtype C and specific HIV-1 subtype/CRF distribution in men having sex with men in Senegal. 16th Conference on Retroviruses and Opportunistic Infections; Montreal, QC, Canada, 2009: abstr W-172.
- 56 van Harmelen J, Wood R, Lambrick M, Rybicki E, Williamson A-L, Williamson C. An association between HIV-1 serotypes and mode of transmission in Cape Town, South Africa. *AIDS* 1997; **11**: 81–87.
- 57 Potts M, Halperin D, Kirby D, et al. Reassessing HIV prevention. *Science* 2008; **320**: 749–50.
- 58 UNAIDS, WHO. AIDS epidemic update 2007. http://data.unaids.org/pub/EPISlides/2007/2007_epiupdate_en.pdf (accessed July 1, 2009). Geneva: UNAIDS, WHO, 2007.
- 59 Wilson D, Halperin DT. "Know your epidemic, know your response": a useful approach if we get it right. *Lancet* 2008; **372**: 423–26.
- 60 Chen L, Jha P, Stirling B, et al. Sexual risk factors for HIV infection in early and advanced HIV epidemics in sub-Saharan Africa: systematic overview of 68 epidemiological studies. *PLoS One* 2007; **10**: e1001.
- 61 Gouws E, White P, Stover J, Brown T. Short term estimates of adult HIV incidence by mode of transmission: Kenya and Thailand as examples. *Sex Transm Infect* 2006; **82**: iii51–55.

- 62 Colvin M. Review of the UNAIDS/GAMET modes of transmission process in five countries. AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008. <http://www.aids2008.org/Pag/ppt/SUSAT2802.ppt> (accessed July 1, 2009).
- 63 UNGASS. Monitoring the Declaration of Commitment on HIV/AIDS. Guidelines on construction of core indicators, 2008. Geneva: UNGASS, 2007.
- 64 amfAR. MSM, HIV and the road to universal access—how far have we come? New York: amfAR, 2008.
- 65 Victor-Ahuchoga J. Characterising the HIV epidemic in West Africa. AIDS 2008–XVII International AIDS Conference; Mexico City, Mexico; Aug 3–8, 2008. <http://www.aids2008.org/Pag/ppt/SUSAT2810.ppt> (accessed July 1, 2009).
- 66 Moreau A, Tapsoba P, Ly A, Niang CI, Diop AK. Implementing STI/HIV prevention and care interventions for men who have sex with men in Dakar, Senegal. Horizons research summary. Washington, DC: Population Council, 2007.
- 67 Ottosson D. State-sponsored homophobia. A world survey of laws prohibiting same sex activity between consenting adults. The International Lesbian, Gay, Bisexual, Trans and Intersex Association, 2009. http://www.ilga.org/statehomophobia/ILGA_State_Sponsored_Homophobia_2009.pdf (accessed July 1, 2009).
- 68 Pew Global Attitudes Project. World publics welcome global trade—but not immigration. Washington, DC: Pew Research Center, 2007. <http://pewglobal.org/reports/pdf/258.pdf> (accessed July 1, 2009).
- 69 Díaz R, Ayala G, Bein E. Sexual risk as an outcome of social oppression: data from a probability sample of Latino gay men in three US cities. *Cultur Divers Ethnic Minor Psychol* 2004; **10**: 255–67.
- 70 BBC News. Shock at Senegal gay jail terms. Jan 8, 2009. <http://news.bbc.co.uk/1/world/africa/7817100.stm> (accessed July 1, 2009).
- 71 WHO, UNDP, UNAIDS. Prevention and treatment of HIV and other sexually transmitted infections among men who have sex with men and transgender populations. Report of a technical consultation, Sept 15–17, 2008. Geneva: WHO, UNDP, UNAIDS, 2009.
- 72 Tapsoba P, Moreau A, Niang Y, Niang C. What kept African professionals from studying MSM and addressing their needs in Africa? Challenges and obstacles. AIDS 2004–XV International AIDS Conference; Bangkok, Thailand; July 11–16, 2004: abstr WePeC6155.
- 73 Gupta RG, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. *Lancet* 2008; **372**: 764–75.