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Substance use and HIV risk among men who have sex with men in Africa: A systematic review

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Abstract

Background—Substance use and its relation to HIV risk among men who have sex in Africa, a population at high risk for HIV, has received little attention.

Methods—This systematic review summarizes and discusses findings from 68 empirical studies, published between 1980 and 2016 that included data about substance use in MSM in Africa.

Results—Substance use has rarely been the primary focus of studies in African MSM. In general, measurement of substance use was suboptimal. Whereas prevalence of alcohol use varied across studies, partly resulting from variety in assessment strategies, it seemed higher than in the general male population across countries. Alcohol use was associated with sexual risk practices, but not with HIV infection. The most frequently reported drug used by African MSM was cannabis. Use of other drugs, such as cocaine and heroin seemed relatively rare, although injection drug use was exceptionally high in a few studies. As alcohol, drugs were regularly used in conjunction with sex. Both alcohol and drug use were often associated with other risk factors for HIV infection, including violence and transactional sex. No interventions were found addressing substance use among African MSM.

Conclusion—Given high HIV-risk and prevalence in this population, substance use should be studied more in-depth, taking into account the specific social and cultural context. Assessment of substance use practices in this population has to be improved. The available information suggests, though, that there is an urgent need for interventions addressing substance use tailored to the needs of this critical population.

Keywords

Substance use; Sexual risk behavior; HIV infection; Men who have sex with men; Africa

Introduction

The relationship of substance use with sexual risk and HIV infection among men who have sex with men (MSM) has primarily been studied in high income countries.^{1–4} Findings from these studies show the importance of substance use as a risk factor. Much less is known about this relationship in MSM populations in Africa, even though substance use has been found to contribute considerably to the general burden of disease in sub-Saharan Africa.^{5–8} Reviews have been conducted of studies on substance use and HIV in sub-Saharan Africa, but they have not focused on MSM.^{8–11} Possible reasons for why MSM research has received limited attention are the prominent role of heterosexual transmission in the sub-Saharan HIV/AIDS epidemic, and the social stigma and criminalization of homosexual behavior. However, studies have found that MSM are at elevated risk of HIV infection even in generalized epidemics, with HIV prevalence as high as 50%.^{12–27} This paper systematically reviews research on both alcohol and drug use (when combined referred to as substance use) among MSM in Africa, and its association with HIV risk and infection. We report on the methods used to assess substance use, summarize the findings and conclusions regarding the prevalence of substance use and the associations of substance use with sexual risk behavior and HIV infection, and discuss the implications for future HIV research and interventions for MSM.

Methods

We performed a literature search to identify studies that addressed substance use among MSM in Africa, by using the following terms “MSM” or “gay” or “homosexual” and “Africa” in Medline, PsychINFO, PubMed, and Web of Science, resulting in 3,817 references (Figure 1). To be included in the systematic review, articles had to: (1) be published between January 1, 1980 and the date that the search was conducted (January 18, 2016); (2) include an available abstract; (3) report on one or more qualitative and/or quantitative empirical studies among MSM in any part of Africa; and (4) include information on substance use. Duplicate references and references without an abstract were removed. Two independent reviewers screened titles and abstracts of the remaining references to determine whether it concerned a research study that included empirical data about MSM in Africa. If this was case, the original publication was screened for reports about alcohol or drug use. In addition, reference lists from articles were searched for additional publications that may not have been identified in the initial search. We excluded two studies that mentioned that substance use was assessed but did not report any

findings^{27,28} and studies of samples that included MSM from both African and non-African countries but did not provide data for the African sample independently.²⁹ In total, we identified 68 published papers, describing findings from 53 independent studies. A number of these papers were based on the same open cohort or presented findings from a sub-sample of the total sample described in another manuscript (see Supplemental Table 1).

Two independent coders extracted the following information from each selected article: how drug and alcohol use was assessed; types of drugs surveyed; prevalence of drug and alcohol use; association of drug and alcohol use with sexual risk practices, HIV prevalence/incidence, and other variables (e.g., potential correlates, determinants, outcomes); and conclusions, if any, drawn about drug and alcohol use. All data extractions were in agreement.

Results

The 68 studies included in this systematic review covered a range of research topics (Supplemental Table 1). With two exceptions,^{30,31} alcohol or drug use was not the primary focus of these studies. Studies included diverse MSM populations [e.g., male sex workers,³² MSM living with HIV,³³ gay, lesbian and bisexual persons,³⁴ and participants in a pre-exposure prophylaxis (PrEP) trial³⁵ a few studies exclusively surveyed substance users.^{36,37} Most studies were quantitative surveys, some included HIV testing; a few were ethnographic studies. Ethnographic methods included observations, focus group discussions, qualitative interviews and case studies. Most studies included an assessment of substance use as such or of substance use during last sex. There was great variability in terms of how the constructs of interest were assessed (e.g., number of questions, time frames, answering format). Substance use rarely was the primary focus of these studies, therefore a detailed description of the assessment of substance use was not always provided; if not reported, assessment procedures could usually be deduced from the results sections.

Alcohol use

Assessment of alcohol use—Alcohol consumption was mostly assessed in terms of *frequency* (e.g., number of days in the last week that one consumed any alcohol; and alcohol consumption in past 30 days: never, once a week or less, more than one a week) and *quantities* (e.g., how many drinks containing alcohol one had on a typical day when drinking) (see Table 1). Some studies used Likert-type scales; in other cases, a “yes” or “no” answer was elicited. Other questions assessed the *self-identified relationship with alcohol* (e.g., “How often would you say you were drunk?” and “I consider myself a: teetotaler, alcohol user, alcohol abuser, alcoholic”). Five studies used validated instruments such as the AUDIT (The Alcohol Use Disorders Identification Test; 10 items) or the AUDIT-C (3 items) to screen for *alcohol use-related problems*. Finally, fifteen independent studies did not assess alcohol as such, but asked whether sex took place *under the influence* of alcohol and drugs, either in general or specifically regarding a last sex event (see Table 2). In a similar vein, one study assessed the most commonly used substances during sex.³⁸ One other study asked whether men had six or more drinks before anal sex in the last week.³⁹ None of the studies assessed alcohol dependence.

Frequency and quantity of alcohol use—The prevalence of alcohol use among MSM varied, ranging from 50% in South Africa⁴⁰ to 100% in Kenya⁴¹ (no time period or quantity specified) (Table 1). A much lower percentage of 1.4%, a clear outlier, was reported in a study among MSM in Egypt.⁴² Proportions did not decrease when the time period was specified as one month. For instance, almost two-thirds of men in a Kenyan study⁴³ and 82.5% in a study in Botswana³⁹ reported having used alcohol in that period. Using alcohol once or more than once a week in the past month was reported by 61.7% and 67.5% among men in Uganda³¹ and Cote d'Ivoire.⁴⁴ Chapman et al.⁴⁵ reported that 22.4% of the studied MSM in Rwanda drank alcohol every day in the past month. In a study among substance users in South Africa,³⁸ 89.8% reported that, in past 90 days, alcohol was the most commonly used substance. Having a confidant—someone one to confide in regarding health, emotional distress and sex—was associated with lower odds of alcohol use (OR 0.22, $p < 0.01$, CI95% 0.078 – 0.64).⁴⁶ Qualitative interviews indicated that for some African men using alcohol is a way of coping with the stigma of being MSM,^{40,47} as has been previously suggested.^{39,48}

Studies that used the AUDIT or the AUDIT-C included more information about the impact of alcohol. Based on the AUDIT, Sandfort et al.²¹ classified 44.4% of the men in a South African study as hazardous drinkers; Lane et al.²⁴ reported that almost all of the MSM in South African rural areas in their study met AUDIT-C criteria for alcohol misuse; in Mozambique proportions of hazardous drinkers based on the AUDIT-C varied by town, ranging from 32.3% to 43.8%.⁴⁹ Among MSM in Kenya, Muraguri et al.³² estimated 22.7% of the men to be alcohol dependent. In his study among South African MSM, Lane et al.³⁰ created three categories of men: irregular drinkers (men who drank alcohol less than once per week and were drunk less than once a week); regular drinkers (men who drank alcohol once a week or more and were drunk less than once a week); and regular drinkers to intoxication (men who drank alcohol once a week or more, and were drunk once a week or more), with 36.1%, 23.8%, and 40.1% of the men filling these categories, respectively.

Alcohol use and sexual risk—Five quantitative studies observed associations between alcohol use and unprotected sex^{30,44,50–52}; only one study explicitly reported an absence of this relationship.³¹ For example, Aho et al.⁴⁴ found that the frequency of alcohol consumption in the past 30 days was associated with unprotected anal intercourse, independently of a series of other risk factors; among those who had not used alcohol in past 30 days, 52.2% had inconsistent condom use versus 70.7% among those who had used alcohol once a week or less, and 74.4% among those who used alcohol more than once a week [adjusted odds ratio (AOR) and 95% confidence interval (95%CI): 2.05 (1.14, 3.69) and 2.48 (1.13, 5.44), respectively]. Geibel et al.⁵⁰ found, in a study among male sex workers, that condomless sex with clients was independently associated with frequent alcohol use (3–7 drinking days per week; AOR: 1.63; 95%CI: 1.05, 2.54). Lane et al.³⁰ found alcohol use to be independently associated with condomless sex [AOR (95%CI) for men who reported regular drinking was 4.1 (1.4, 12.6) and for men who reported regular drinking to intoxication 2.6 (1.0, 6.8)]; he also found alcohol use to be associated with other risk factors, including multiple partnerships, sex in a public venue, experiences of coerced sex with other men, symptoms of rectal trauma associated with anal intercourse, and STI

symptoms in the past 12 months. Another study found alcohol use to be associated with less communication about one's HIV status with a partner.⁵³ Alcohol use was also found to be associated with transactional sex⁵⁴ and sexual coercion.³⁰

Alcohol use at specific sexual events—Several studies reported the occurrence of sex under the influence of alcohol (Table 2).^{17,19,39,55–57} The proportions of men reporting sex under the influence of alcohol varied from 47.3% (Cape Town, South Africa) to 77.5% (Nairobi, Kenya).¹⁷ Park et al.⁵⁶ reported that 66.1% of the men had sexual intercourse after drinking alcohol in past 12 months (Cameroon); Rispel et al.¹⁹ reported that almost three-quarters (73.4%) of participants reported having sex while under the influence of alcohol. In a sample of substance using MSM, alcohol was, after cannabis, the most frequently used substance during sex (42.6% and 65.7%, respectively).³⁸

One study⁵² looked specifically at the use of alcohol 2 hours prior to sex and found an independent association with increased likelihood of anal sex without condoms; among those men who reported anal sex without condoms in the past 6 months, 80.4% used alcohol in the 2 hours before sex compared to 65.9% among men who did not report sex without condoms in past 6 months.

Given the general availability of alcohol in places where men meet or look for sex partners or clients, sex often occurs under the influence of alcohol.⁵⁸ Alcohol might facilitate interactions; as a man in Namibia stated: “The ‘straight’ guys ... approach us only when they are drinking or are drunk. We do not sleep together in the day, mostly we sleep with each other at night. It is difficult to make them wear a condom when they are drunk” (59, p. 442). A qualitative study⁶⁰ showed that alcohol is also used to reduce pain associated with being the receptive partner in anal sex (“When I am sober, I feel the sex pain. When I’m drunk I don’t feel it,” said one participant p. 323), although alcohol can also make sex less controlled and rougher, and consequently also cause pain, and increase risk of HIV transmission.

MSM seemed to be aware of alcohol as a risk factor for unprotected sex, as one study among Kenyan MSM argued (no further details were provided).⁶¹ In qualitative interviews, some men stated that alcohol decreased the likelihood of using condoms.⁴¹ Many men noticed that, while increasing sexual interest, alcohol use often leads to poor decision-making, and even men who reported frequent condom use mentioned not using them when intoxicated.^{58,62} Baral et al.⁶³ observed that nearly half of the sample (47.8%, 110/230) reported being less likely to use condoms during sexual intercourse when drunk. Some men who reported continued risk behavior often linked it to alcohol use⁴⁷; as one participant in this study put it, “Most of the time we have sex without a condom it is when we are drunk.” p. 4 Excessive alcohol use has been reported to coincide with group sex, which, in turn, was found to be associated with HIV incidence in African MSM.¹⁶

Alcohol use did not always lead to condomless sex, though. Siegler et al.⁶⁴ who found that 1 in 3 men in their study who mentioned having sex while intoxicated also reported that some men succeeded in using condoms despite alcohol use; the men generally did so by

employing specific strategies, such as having a clear expectation of which partner would procure condoms.

Alcohol use and HIV infection—An association of alcohol use with HIV infection was found in one study,²¹ but not in eight other studies.^{12,19,23,24,49,65–67} Sandfort et al.²¹ found that men in South Africa who tested HIV-positive in the study were more likely to be categorized as hazardous drinkers as measured by the AUDIT than HIV-negative men (54.5% versus 40.0%; AOR: 1.81; 95%CI: 1.06, 3.07). Baral et al.⁶⁸ reported that men in Swaziland who drank alcohol at least one day in the preceding month were not more likely to be HIV infected than other men (AOR based on weighted data: 2.18; CI95%: 0.60, 7.95). Hakim et al.,⁶⁷ with a more sensitive measure, found that men who drank alcohol once a week or less and men who drank more than once a week were not more likely to be HIV positive compared to men who reported never using any alcohol (OR 0.89; 95%CI: 0.62, 1.28; and OR 1.12; 95%CI: 0.82,1.52, respectively). Sanders et al.¹⁶ reported HIV incidence among non-alcohol users incidence as 7.6 per 100 person years (PY; 95%CI: 5.0, 11.5) compared to 9.3 per 100 PY; 95%CI: 6.8, 12.5; unadjusted incidence rate ratio: 1.2; 95%CI: 0.7, 2.1) among men who had used any alcohol in the preceding month. Rispel et al.¹⁹ who also did not find an association between alcohol use and HIV prevalence among MSM in South Africa noted that this was surprising given findings from other studies and suggested that this lack of association may be attributable to not having asked detailed questions about the participants' drinking habits and to sex under the influence of alcohol being pervasive among participants. Lane et al.²³ also explained the lack of association between problem drinking and HIV status as a consequence of homogeneity of the sample in its drinking behavior (i.e., 75.9% of the men classified as having problem drinking). One study found a relationship of alcohol use with sexually transmitted infections (STI), but not with HIV infection: men who reported using alcohol before sex were almost five times more likely to test positive for STI compared to men who reported not using alcohol before sex.³¹

Alcohol use and PrEP—In the first PrEP-related studies, MSM mentioned alcohol as a reason for forgetting to take PrEP, whereas there was also a concern about possible interactions between alcohol and PrEP⁵⁷; “The drug should go well with beer,” a participant explained.^{57, p. 2167} The effect of alcohol on adherence to PrEP might be dependent upon regimen; especially if PrEP is supposed to be taken post-coitally, alcohol use could reduce adherence.^{57,69} This is supported by findings that alcohol use was marginally associated with lower daily adherence (and not with other dosing groups).³⁵ Liu et al.²⁹ did not find a relationship between reported alcohol use and presence of PrEP in the blood over time. Mugo et al.³⁵ also reported that even though qualitative findings suggest that alcohol use impacts PrEP adherence, this association was not substantiated with quantitative data.

Drug Use

Assessment of drug use—Although 60 of the 68 papers reported on drug use, a substantial number of studies (n = 14) did not describe how drug use was assessed (Supplemental Table 2). A few other studies reported that drug use was assessed, but did not present any findings.^{12,31} Some studies mentioned that ethnographic observations were done on substance use of MSM in social settings but did not further specify the assessment of

drug use,⁵⁹ resulting in reports that drug use was “significantly prevalent.”⁷⁰ Other studies varied in terms of: (1) whether drug use is asked in a general way (e.g., “any drug use”) or more specifically (e.g., injection versus non-injection drug use); (2) the time period that was reported on (e.g., ever, past year, past 6 months); and (3) the number of questions asked (Table 2). In a few studies, participants were asked with an open question which drugs they had used,³⁸ while others referred to “illicit drugs” and “street drugs” rather than specific drugs.⁶⁹ A few studies assessed drug use in relation to sexual activity.^{52,71} Only one study used the Drug Abuse Screening Test (DAST-10), a validated screening test for problems related to drug use.²¹ In one study, “drug abuse” was excluded from the survey because of the topic’s sensitivity.⁷² None of the studies assessed drug dependence.

Variety, frequency and quantity of drugs used—Nineteen studies reported proportions of men using drugs without specifying the kind of drug, sometimes also including injection drug use, other times specifically excluding it (Supplemental Table 2). The prevalence of drug use varied by reporting period and by country, ranging from a prevalence of 7% in the past year among MSM in Nigeria²⁵ to 61.2% in the past three months among MSM in Zanzibar.²² Using the same assessment strategy, Zahn et al.⁷³ reported a prevalence of drug use of 2.5%, 6.8%, 8.0%, and 13.2% in South Africa, Botswana, Namibia, and Malawi, respectively.

The most commonly drug used was *cannabis*, with a prevalence varying from 8.2% (past 12 months)⁴⁵ to 29% (ever used)^{30,74} (Supplemental Table 2). Cocaine and heroin use was comparatively low: the highest prevalence was 3.1% and 2.0%, respectively, among MSM in Rwanda.⁴⁵ Opium use was reported by 1.4% MSM in Egypt.⁴² Use of other specific drugs was less frequently reported; Lane et al.²³ reported on use of ecstasy (4.0%); GHB (Gamma Hydroxybutyrate; 0.3%); methamphetamine: (“tik”; 0.3%), methaqualone (“mandrax”; 1.9%), methcathinone (“cat”; 0.3%), and nyaupe (cannabis and heroin; 1.3%), suggesting that use of such drugs is rare. However, Rebe et al.⁵⁵ reported that 37% of MSM patients at a health clinic in Cape Town reported ever having used crystal methamphetamine; use was much lower among Black MSM compared to White and Coloured/other MSM (19%, 32%, and 57%, respectively). Use of specific drugs varied within countries; Nalá et al.⁴⁹ reported prevalence of cannabis use in the preceding 12 months among MSM in Mozambique ranging from 4.0% (Nampula/Nacala) to 11.8% (Maputo). Likewise, Lane et al.²³ reported a prevalence of 0.4% and 8.2% of cannabis use in two separate South African study sites.

Williams et al.³⁸ reported the most commonly used drugs in the past 90 days among 3475 South African, *drug-using MSM*; these drugs included amylbutyl nitrate, cannabis, cocaine, ecstasy, heroin, methamphetamine, methaqualone, and methcathinone; the reported prevalence varied from 2.3% (heroin) to 36.1% (cannabis); (see also³⁷).

Injection drug use varied remarkably per study, partly in relation to the period of observation, as well as the study sample (Supplemental Table 2). Injecting drug use in the past month was reported to be 7.7% among MSM in Nigeria.⁷⁵ Prevalence of drug use in the past 3 months ranged from 1.4% for MSM in Kenya¹⁸ to 13.9% for MSM in Tanzania.⁷⁶ The 6-month and past year range is 0.0% in Botswana³⁹ to 12.2% in Malawi,⁷⁷ and 0.7% in Tanzania⁷⁴ to 7.7% in Lesotho,⁶³ respectively. “Ever” drug injection was reported by 1 out

of 96 men in Vuylsteke's study in Cote d'Ivoire⁷⁸ and 2 out of 1432 men in Nalá et al.'s study in Ghana.⁴⁹ In South Africa, a prevalence of injection drug use of 46% among HIV positive MSM was reported (which was significantly higher than among HIV-positive men who only had sex with women)⁷⁹ and 42.3% among drug-using MSM³⁷ (no time frames were specified). A study among Nigerian MSM indicated the importance of assessment procedures: with Audio Computer-Assisted Self-Interviewing (ACASI), the reported injection drug use was 40 times higher than in face-to-face interviews.⁷⁵ Baral et al.⁷⁷ reported that almost one in five MSM were not willing to answer a question about injecting drug use.

In a qualitative study, MSM explained they use substances to feel free, to get high and get rid of inhibitions when soliciting and engaging in sexual relationships, and for seducing new individuals into sexual relationships.⁷⁰

Drug use and sexual risk—Associations between drug use and sexual risk behaviors (operationalized as having had unprotected sex or number of partners) were reported in a few studies. Aho et al.⁴⁴ reported that inconsistent condom use was not significantly higher among MSM who used non-intravenous drugs compared to MSM who did not (78.9% vs. 63.9%, respectively; OR: 2.11; 95%CI: 0.84, 5.30, $p = 0.11$). Johnston et al.⁷⁶ who compared MSM who injected drugs with non-injecting MSM, found that men in the first group were significantly more likely to have two or more non-paying male receptive sex partners (48.9% versus 27.6%; OR: 1.3, 95%CI: 1.1, 1.5, $p < .001$), to have engaged in group sex in the past month (34.1% versus 19.5%; OR: 2.5; 95%CI: 1.3, 5.0, $p < .01$), and to have symptoms of a sexually transmitted infection in past 6 months (57.8% versus 14.9%; OR: 8.8; 95%CI: 4.5, 17.2, $p < .001$). MSM who injected drugs (IDUs) were also less likely to have used a condom at last sex with a paid and non-paid female partner (respectively, 15.6% versus 27.9%; OR: 0.2; 95%CI: 0.0, 0.8, $p < .05$; and 2.2% versus 29.8%; OR: 0.08; 95%CI: 0.0, 0.3, $p < .001$), and to have ever been tested for HIV (6.9% versus 21.4%; OR: 0.3; 95%CI: 0.1, 0.7; $p < .01$). Eaton et al.,⁵¹ who compared men who have sex with men and women (MSMW) with men who only had sex with women, found that drug use was associated with high risk sex (more than two sex partners and unprotected sex) in the latter but not in the former group, while drug use in past 4 months did not differ between both groups (24.4% and 27.0%, respectively).

As with alcohol use, drug use was often found to be associated with other risk factors for HIV transmission. Heusser & Elkonin⁷¹ observed that recreational drug use and drug use in sexual context were both more frequent among MSM who had experienced child sexual abuse (OR 1.85; 95%CI: 0.99, 3.44; and OR: 3.06; 95%CI: 1.64, 5.74), respectively]; both forms of drug use also mediated the relationship between child sexual abuse and number of sex partners.⁷¹ Another study found injecting drug use to be associated with negative experiences including denial of housing, being afraid to seek healthcare, denial of healthcare, being blackmailed, being beaten by the police, and being afraid to walk in the community.⁷³

Drug use at specific sexual events—Several studies reported on engaging in sex after or while using drugs (Table 3). Park et al.⁵⁶ reported that 8.4% of the MSM ever had sexual

intercourse after taking drugs. Strömdahl et al.⁸⁰ reported that 31.4% of 287 MSM reported having sex under the influence of drugs. About one in ten participants in Rispel et al.¹⁹ reported having sex under the influence of drugs compared to almost three-quarters of participants who reported having sex while under the influence of alcohol; sex under the influence of drugs (or alcohol) was not more prevalent among HIV-positive men compared to HIV-negative men. Among patients in a men's clinic, ever having had sex under the influence of drugs was less frequently reported by Black MSM compared to White and Coloured/other MSM (23%, 63%, and 69%, respectively).⁵⁵ Without further specification, Gebreyesus and Mariam⁷⁰ reported that the sexual activities that their participants engaged in were mostly accompanied by the use of drugs (including alcohol). Williams et al.³⁸ reported that the most commonly used substances during sex in 3475 drug-using MSM were cannabis: 65.7%, methamphetamine: 12.7%, and ecstasy 7.4%; other drugs, including heroin and cocaine, were reported in relation to sex by less than 5% of the men (alcohol was reported by 42.6%). Lorway⁵⁹ reported that study participants used cocaine or dagga (cannabis) when engaging in sex work; one of his participants noted that drug use made it more difficult to engage in safer sex (see also ⁸¹).

In a study involving drug users with various backgrounds (MSM, commercial sex workers, IDUs), Parry et al.³⁶ reported a strong relationship between drug use and risky sexual practices, with drugs often being used before, during and after sex, generally to augment the sexual experience (e.g., crack cocaine was used to help commercial sex workers to get the energy to do their sex work). Parry et al. also observed that the combination of drugs and sex seemed to be embedded in the MSM culture, where drugs appear to facilitate sexual behaviors, both physiologically and psychologically. Based on ethnographic assessments, another study³⁷ involving a smaller sample (N = 78) and only including drug-using MSM reported that drugs reduced inhibitions and resulted in forgetting condoms or being okay with not using them. For them, drugs also enhanced sexual experiences, and facilitated sex with strangers and having orgies. Drug use also seemed to enhance other non-sexual activities such as socializing and coping. Several MSM in this study indicated that they either exchanged sex for money to buy drugs or received drugs in exchange for sex. Injection drug-using MSM seemed to engage in a number of high-risk injecting practices, despite knowledge of HIV transmission risk through needle sharing. Similar descriptions were reported by Gebreyesus and Mariam⁷⁰; MSM in this study explained using substances “to feel free, to get high and get rid of inhibitions when soliciting and engaging in sexual relationships.”^{p. 275} Based on qualitative research, it was concluded that substance use was a strategy that MSM used to cope with mental stress resulting from sexual orientation-related bias.^{39,40,47} Drug use prior to sex has been found to be associated with low self-efficacy and depression.⁵²

Participants in a qualitative study, noted that being high on alcohol or drugs increases one's sexual urge and that, when high, it is difficult to maintain self-control and to think about condoms when having sex; one man said: “Some MSMs use drugs and alcohol which affect their normal reasoning capacity”.^{62 p.8} The majority of MSM (72.6%) in another qualitative study⁶¹ thought that drug use was a risk factor for HIV. In another study, 80% of drug-injecting MSM believed that they were at risk for HIV, but only 41% thought this was from injecting drugs.⁷⁶

In a qualitative study among substance-using MSM, it was found that when men were high, they did not think about condoms and safe sex or were happy to forgo condom use.³⁷ In this study, drug use also influenced risky sexual behavior in the form of having sex with strangers, participating in 'orgies' without condoms, having multiple partners, engaging in prolonged sex sessions, and having unprotected sex to acquire drugs. Drugs also affected the kind of sex men were willing to partake in (for instance, men said they did not to engage in anal sex when sober).³⁶

One study⁵² reported that men who used drugs 2 hours prior to sex were more likely to report unprotected anal sex than men who did not (AOR: 3.2; 95%CI: 1.53, 6.70). One explanation for this could be that under the influence of drugs, there is less communication about one's serostatus,⁵³ as noted earlier regarding alcohol use.

Drug use and HIV infection—A few studies that assessed drug use also reported on its association with HIV infection. The findings suggest that the type of drug and the way it was used mattered, as well as whether HIV prevalence or incidence was the outcome.

Lane et al.²⁴ reported an RDS-adjusted HIV prevalence of 28.3% and 13.7% for two sites in South Africa but concluded that, in bivariate analysis, cannabis use was not significantly related to HIV prevalence in either sample. In another study, Lane et al.²³ found a negative association between cannabis use in the past 6 months and HIV infection: the prevalence among men who smoked cannabis was 10.5% compared to 14.1% among men who did not smoke ($p < 0.01$). In a study among male sex workers,⁶⁵ current cannabis use was associated with lower odds of HIV prevalence (AOR: 0.40; CI95%: 0.18, 0.90, $p = .051$); the overall HIV prevalence among MSM in this study was 40.0%.⁶⁵

In a sample of 712 MSM, Vu et al.²⁵ found an HIV prevalence ranging from 11.3% to 34.9% in three large Nigerian cities; whereas the factors associated with HIV prevalence varied by city, drug use was not associated with HIV prevalence in any of these cities. Comparing HIV prevalence in MSM with a drug problem to the prevalence in MSM without a drug problem, Sandfort et al.,²¹ found no difference (29.6% versus 30.2% respectively, OR: 0.98; 95%CI: 0.53, 1.83). Hladik et al.,⁶⁶ who found an HIV prevalence of 13.7% in an RDS generated sample of 300 MSM in Kampala, Uganda, reported that a history of illicit drug use and injection drug use were surprisingly associated with lower odds for having HIV infection in bivariate analysis (respectively, 4.8% versus 17.1%, OR: 0.14; 95%CI: 0.04, 0.54, $p < .01$; and 3.1% versus 14.9%, OR: 0.08; 95%CI: 0.01, 0.60, $p < .05$); in the multivariate analysis, self-reported drug use, regardless of mode of application, continued to be inversely related with HIV seropositivity (OR: 0.15; 95%CI: 0.04, 0.65, $p < 0.01$). Baral et al.,⁶⁸ reported that MSM who had used any non-injectable drug in the past 12 months were less likely to be HIV positive compared to non-drug using MSM, but in the RDS-weighted multivariate analysis, this relationship was no longer significant. Use of crystal methamphetamine and sex under the influence of drugs were both found to be associated with asymptomatic STIs [OR (95% CI): 1.8 (0.88–3.70) and 1.59 (0.77–3.29), respectively].⁵⁵

Although only reported by a small proportion of MSM in Mombasa, Kenya, recent intravenous drug use was strongly associated with HIV-1 positivity.¹⁸ The same relationship

is reported by Dahoma et al.²² in MSM in Zanzibar, Tanzania: in multivariate analyses, HIV infection was positively associated with injecting drugs in the past 3 months (AOR: 2.4; 95%CI: 1.1, 5.3; overall HIV prevalence in this sample was 12.3%). Baral et al.⁶³ reported that injecting drug use in the past year (7.7% of 183 MSM) was associated with self-reported HIV infection (OR: 5.1; 95%CI: 1.1, 22.5, $p < 0.05$) among MSM in Lesotho. Johnston et al.⁷⁶ compared injection-drug-using MSM with non-using MSM and found that MSM-IDU were significantly more likely to be infected with HIV (24.7% versus 10.6%; OR: 2.3; 95%CI: 1.4, 6.5, $p < .01$; RDSAT adjusted estimations). One of the few studies in Africa¹⁶ that assessed HIV incidence among MSM did not find a significant relationship with intravenous drug use: incidence among people who did not use intravenous drugs since last visit was 8.5 per 100 PY versus 33.9 per 100 PY among MSM who did (unadjusted IRR: 4.0; 95%CI: 0.5, 34.7, $p = .20$).

Discussion

Summary of major findings

This is the first systematic review of the state of research on substance use and HIV risk and infection among MSM in Africa. We examined three major areas: (1) the type of questions or tools that have been employed to assess alcohol or drug use; (2) the frequency of alcohol and drug use; and (3) the relationship of alcohol and drug use with sexual risk and HIV infection. Most of the 68 studies identified for inclusion in this review were conducted in Sub-Saharan African countries where Christianity is the predominant religion.

The 68 studies that included assessments of substance use covered a range of research aims. Very few of these studies had substance use as their primary focus, partly explaining the fact that assessment of substance use was not always specified. Standardized measures, such as the AUDIT or the DAST-10, were rarely used. None of these studies examined the psychometrics of substance use measures.

The frequency of alcohol and drug use varied across studies. Some studies reported substantial proportions of MSM engaging in hazardous drinking, whereas in other studies alcohol use was comparatively lower, probably reflecting general geographic and cultural differences between African countries.¹¹ The frequency of drug use varied as well, with relatively high levels of use of cannabis compared to other drugs. One study commented that substance use among MSM was primarily limited to the use of alcohol,²⁴ other studies stated that drugs use was relatively rare.^{16, 45}

Several studies explored and generally corroborated the positive association between the use of alcohol or drugs and engagement in HIV risk behaviors. This is consistent with other studies, conducted in Africa among populations in general^{8–11} as well as in non-African based studies.^{1–4} In addition, studies reported associations between substance use and various other risk factors for HIV infection, including violence and transactional sex. Inconsistent with other studies, though, very few of the reviewed studies found an association between substance use and HIV infection.

Discussion of findings

Patterns of substance use among MSM across African countries are heterogeneous. Undoubtedly there are differences within countries as well, although our review did not focus on these. It is difficult to make generalizations about substance use among MSM in Africa because of the variety in assessment strategies, the limitations of self-report, and the lack of generalizability within studies. It is difficult to determine whether the frequency of substance use among MSM in Africa is high or low compared to men in Africa in general or to MSM in Western settings. It seems, however, that the frequency of alcohol use, whether or not in association with sexual activity, is relatively high. Authors observed this regarding MSM in Botswana,⁷² Mozambique,⁴⁹ Rwanda,⁴⁵ South Africa,³⁰ and Uganda.³¹ Although the prevalence of substance use in MSM varied across countries, comparisons with rates provided by the WHO for the male population in various African countries⁸² strongly indicate that within countries, alcohol use is more prevalent among MSM. The frequent use of alcohol among MSM in Sub-Saharan Africa suggests that alcohol use is a serious problem that requires preventative attention in its own right.⁴⁹

Compared to other drugs, there was a high prevalence of cannabis use among African MSM, which reflects the situation in the world in general.⁸³ The prevalence of reported cannabis use is also variable, with remarkably high levels in some of the reviewed studies, for instance among MSM in Botswana,³⁹ Rwanda,⁴⁵ and South Africa,³⁰ in comparison to the best estimate of 7.5% presented by the United Nations Office on Drugs and Crime (UNODC)⁸³ for Africa in general. Injection drug use is low across Africa compared to other parts of the world—the best estimate of the proportion of people in Africa who inject drugs presented by the UNODC⁸³ is 0.17% compared to 0.68% in Europe and 0.66% in North America—however, some of the studies reviewed here reported a relatively high prevalence of IDU, particularly in Malawi,⁷⁷ Namibia,⁷⁷ Nigeria,⁷⁵ and Tanzania.²² The kinds of drugs used as well as frequency of use should also be understood in relation to their availability.

Associations between substance use and sexual risk practices have been frequently observed in studies in the general population. The importance of the relationship between these two behaviors is underscored by the high prevalence of sex under the influence of substance use observed among Sub-Saharan African MSM. As noted, drug use was viewed as a “sensitive topic” in some studies; therefore, the associations that were observed in the reviewed studies likely underestimate the severity of the problem, as substance use is likely to be underreported. Many men report having sex under the influence of alcohol or drugs despite the fact that in several studies men seemed to be aware of the increased risk of having sex under the influence of drugs. Greater quantities of substance use are associated with greater sexual risk among people in sub-Saharan Africa, generally; whether this is the case among MSM is not clear from the research reviewed here.¹⁰

Substance use was reported to facilitate social and sexual interactions, reinforce sexual desire, induce sexual disinhibition, reduce self-efficacy, and lead to poor decision-making. The overall impact of substance use on sexual interactions between men seemed similar to what is reported about such interactions between men and women. Some reasons that substance use might be relatively more salient to MSM is that it can be used to reduce pain associated with being the receptive partner in anal sex, to help overcome the stigma that is

often associated with same-sex sexuality, or because drinking establishments are often one of the few possible locations for MSM to meet sexual partners. Substance use might also be associated with sexual risk factors that are more specific to MSM, such as multiple partnerships, sex in a public venue, group sex, transactional sex, sexual coercion, symptoms of rectal trauma, and STI symptoms. There also seem to be additional motivations to use substances that are specific to MSM, such as coping with mental stress resulting from sexual orientation-related bias. The fact that substance use did not always lead to condomless sex suggests that there are protective strategies that might work even when under the influence.

With one exception, we found the literature did not support a relationship between alcohol use and HIV infection among African MSM. This deviates from what is found in studies among general populations in sub-Saharan Africa. In a meta-analysis of African studies, Woolf-King et al.¹¹ reported a pooled OR of 1.61 (95% CI: 1.44, 1.80) for the association between alcohol use and HIV infection, with a dose-response relationship. However, most of the studies included in this meta-analysis had cross-sectional designs so it is not possible to determine causality. It is possible that alcohol consumption is an indicator of a lifestyle characterized by a strong concentration of other risk factors including transactional sex and sexual violence.^{84–86} These characteristics seem to separate persons with HIV infection more sharply from the population in general, whereas among MSM alcohol use is less strongly associated with these other risk factors in the studies we reviewed. Furthermore, the temporality of alcohol use and HIV infection is difficult to ascertain as excessive drinking may lead to engagement in risky sex resulting in HIV infection, HIV-positive persons might also drink excessively to cope with their infection, including multiple partnerships, STI symptoms, and experiences of coerced sex with other men. It is likely, though, that alcohol consumption preceded HIV infection.

Given a relative consensus that there is a relationship between substance use and HIV risk among MSM in Africa, it is surprising that we found no interventions in our review of the literature that focused on substance use for HIV risk reduction (one manuscript³⁸ described intervention results but did not include details about the intervention), although there are few tested alcohol interventions in sub-Saharan Africa in general.⁸

Implications for research and prevention

Although this review suggests that there is ample evidence that substance use—alcohol use in particular—is pervasive among MSM in Sub-Saharan Africa, and is associated with increased risk behaviors, the understanding of this association has serious limitations. There is a paucity of information on psychosocial and contextual factors associated with increased substance use, specific to this population. The understanding of how and among whom substance use is affecting HIV transmission is still limited. A few studies noted associations with histories of child sexual abuse, internalized stigma, homophobic environments, but data on these issues among MSM in the African context are limited. These limitations are due to the lack of studies with a primary focus on substance use and HIV, the suboptimal assessment of substance use, the likely underreporting of certain types and modalities of drug use, but also the paucity of research among MSM populations in general. Our findings suggest the need for an increased focus on substance use among African MSM, with an

emphasis on using validated and more objective measures, such as computer-assisted self-interviewing, to reduce underreporting and to get a better understanding of the extent of the problem.

Various authors^{30,71} argued that substance use among African MSM should be understood as reflecting underlying motivational, interpersonal, or situational dynamics associated with HIV risk, and should be studied as such, taking into account the specific cultural context of substance use.^{87–90} We agree that such an understanding is needed in order to develop effective prevention strategies tailored to this population. Although there are few indications of what such prevention efforts should look like, there is a convincing rationale for substance use-related HIV prevention addressing African MSM.^{30,31,39,49} In order for such interventions to be effective, they should do more than promote condom use while under the influence, but also address factors that are likely to moderate or mediate the relationship between substance use and HIV risk behaviors, and the underlying psychosocial and contextual risk factors for substance use. This review offers evidence to guide the formative work that needs to be done to tease out what effective intervention components might look like.

It has been argued that Africa may be on the threshold of a significant escalation in rates of substance use, particularly regarding alcohol consumption and alcohol-related morbidity and mortality.^{91,92} Our review suggests that if this is the case, the problem is likely to be exacerbated among MSM. There is an urgent need for interventions, based on an in-depth understanding of both alcohol and drug use practices and their relation to sexual risk that are tailored to this critical population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Woolf SE, Maisto SA. Alcohol use and risk of HIV infection among men who have sex with men. *AIDS Behav.* 2008; 13:757–782. [PubMed: 18236149]
2. Vosburgh W, Mansergh G, Sullivan P, Purcell D. A review of the literature on event-level substance use and sexual risk behavior among men who have sex with men. *AIDS Behav.* 2012; 16:1394–1410. [PubMed: 22323004]
3. Donovan, McEwan. A review of the literature examining the relationship between alcohol use and HIV-related sexual risk-taking in young people. *Addict.* 1995; 90:319–328.

4. Maisto SA, Simons JS. Research on the effects of alcohol and sexual arousal on sexual risk in men who have sex with men: Implications for HIV prevention interventions. *AIDS Behav.* 2016; 20(suppl 1):158–172.
5. Forouzanfar MH, Alexander L, Anderson HR, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet.* 2015; 386:2287–2323. [PubMed: 26364544]
6. Whiteford HA, Degenhardt L, Rehm J, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *Lancet.* 2013; 382:1575–1786. [PubMed: 23993280]
7. Lim SS, Vos T, Flaxman AD, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012; 380:2224–2260. [PubMed: 23245609]
8. Hahn JA, Woolf-King SE, Muyindike W. Adding fuel to the fire: alcohol's effect on the HIV epidemic in Sub-Saharan Africa. *Curr HIV/AIDS Rep.* 2011; 8:172–180. [PubMed: 21713433]
9. Woolf-King SE, Maisto SA. Alcohol use and high-risk sexual behavior in Sub-Saharan Africa: a narrative review. *Arch Sex Behav.* 2011; 40:17–42. [PubMed: 19705274]
10. Kalichman SC, Simbayi LC, Kaufman M, Cain D, Jooste S. Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. *Prev Sci.* 2007; 8:141–151. [PubMed: 17265194]
11. Woolf-King SE, Steinmaus CM, Reingold AL. An update on alcohol use and risk of HIV infection in sub-Saharan Africa: Meta-analysis and future research directions. *Int J Alcohol Drug Res.* 2013; 2:99–110.
12. Wade AS, Kane CT, Diallo PAN, et al. HIV infection and sexually transmitted infections among men who have sex with men in Senegal. *AIDS.* 2005; 19:2133–2140. [PubMed: 16284463]
13. Wade AS, Larmarange J, Diop AK, et al. Reduction in risk-taking behaviors among MSM in Senegal between 2004, 2007, prevalence of HIV other STIs. ELIHoS Project, ANRS 12139. *AIDS Care.* 2010; 22:409–414. [PubMed: 20131126]
14. Burrell E, Mark D, Grant R, Wood R, Bekker L-GG. Sexual risk behaviours and HIV-1 prevalence among urban men who have sex with men in Cape Town, South Africa. *Sex Health.* 2010; 7:149–153. [PubMed: 20465978]
15. Baral S, Burrell E, Scheibe A, Brown B, Beyrer C, Bekker LG. HIV risk and associations of HIV infection among men who have sex with men in peri-urban Cape Town, South Africa. *BMC Public Health.* 2011; 11:766. [PubMed: 21975248]
16. Sanders EJ, Okuku HS, Smith AD, et al. High HIV-1 incidence, correlates of HIV-1 acquisition, and high viral loads following seroconversion among MSM. *AIDS.* 2013; 27:437–446. [PubMed: 23079811]
17. Price MA, Rida W, Mwangome M, et al. Identifying at-risk populations in Kenya and South Africa: HIV incidence in cohorts of men who report sex with men, sex workers, and youth. *J Acquir Immune Defic Syndr.* 2012; 59:185–193. [PubMed: 22227488]
18. 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; 21:2513–2520. [PubMed: 18025888]
19. Rispel LC, Metcalf CA, Cloete A, Reddy V, Lombard C. HIV prevalence and risk practices among men who have sex with men in two South African cities. *J Acquir Immune Defic Syndr.* 2011; 57:69–76. [PubMed: 21297480]
20. Merrigan M, Azeez A, Afolabi B, et al. HIV prevalence and risk behaviours among men having sex with men in Nigeria. *Sex Transm Infect.* 2011; 87:65–70. [PubMed: 20820061]
21. Sandfort TG, Lane T, Dolezal C, Reddy V. Gender expression and risk of HIV infection among Black South African men who have sex with men. *AIDS Behav.* 2015; 19:2270–2279. [PubMed: 25869555]
22. Dahoma M, Johnston LG, Holman A, et al. HIV and related risk behavior among men who have sex with men in Zanzibar, Tanzania: results of a behavioral surveillance survey. *AIDS Behav.* 2011; 15:186–192. [PubMed: 19997862]

23. Lane T, Raymond HF, Dladla S, et al. High HIV prevalence among men who have sex with men in Soweto, South Africa: results from the Soweto Men's Study. *AIDS Behav.* 2011; 15:626–634. [PubMed: 19662523]
24. Lane T, Osmand T, Marr A, et al. The Mpumalanga Men's Study (MPMS): Results of a baseline biological and behavioral hiv surveillance survey in two msm communities in South Africa. *PLoS ONE.* 2014; 9:e111063. [PubMed: 25401785]
25. Vu L, Adebajo S, Tun W, et al. High HIV prevalence among men who have sex with men in Nigeria: implications for combination prevention. *J Acquir Immune Defic Syndr.* 2013; 63:221–227. [PubMed: 23406978]
26. Baral S, Sifakis F, 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 Medicine.* 2007; 4:e339. [PubMed: 18052602]
27. Beyrer C, Trapence G, Motimedi F, et al. Bisexual concurrency, bisexual partnerships, and HIV among Southern African men who have sex with men. *Sex Transm Infect.* 2010; 86:323–327. [PubMed: 20410078]
28. Fay H, Baral SD, Trapence G, et al. Stigma, health care access, and HIV knowledge among men who have sex with men in Malawi, Namibia, and Botswana. *AIDS Behav.* 2011; 15:1088–1097. [PubMed: 21153432]
29. Liu A, Glidden DV, Anderson PL, et al. Patterns and correlates of PrEP drug detection among MSM and transgender women in the Global iPrEx Study. *J Acquir Immune Defic Syndr.* 2014; 67:528–537. [PubMed: 25230290]
30. Lane T, Shade SB, McIntyre J, Morin SF. Alcohol and sexual risk behavior among men who have sex with men in South african township communities. *AIDS Behav.* 2008; 12(suppl 4):78–85. [PubMed: 17295075]
31. Kim EJ, Hladik W, Barker J, et al. Sexually transmitted infections associated with alcohol use and HIV infection among men who have sex with men in Kampala, Uganda. *Sex Transm Infect.* 2015; 92:240–245. [PubMed: 26424713]
32. Muraguri N, Tun W, Okal J, et al. HIV and STI prevalence and risk factors among male sex workers and other men who have sex with men in Nairobi, Kenya. *J Acquir Immune Defic Syndr.* 2015; 68:91–96. [PubMed: 25501346]
33. Graham SM, Mugo P, Gichuru E, et al. Adherence to antiretroviral therapy and clinical outcomes among young adults reporting high-risk sexual behavior, including men who have sex with men, in coastal Kenya. *AIDS Behav.* 2013; 17:1255–1265. [PubMed: 23494223]
34. Polders LA, Nel JA, Kruger P, Wells HL. Factors affecting vulnerability to depression among gay men and lesbian women in Gauteng, South Africa. *S Afr J Psychol.* 2008; 38:673–687.
35. Mugo PM, Sanders EJ, Mutua G, et al. Understanding adherence to daily and intermittent regimens of oral hiv pre-exposure prophylaxis among men who have sex with men in Kenya. *AIDS Behav.* 2015; 19:794–801. [PubMed: 25432877]
36. Parry C, Petersen P, Carney T, Dewing S, Needle R. Rapid assessment of drug use and sexual HIV risk patterns among vulnerable drug-using populations in Cape Town, Durban and Pretoria, South Africa. *SAHARA J.* 2008; 5:113–119. [PubMed: 18979044]
37. Parry C, Petersen P, Dewing S, et al. Rapid assessment of drug-related HIV risk among men who have sex with men in three South African cities. *Drug Alcohol Depend.* 2008; 95:45–53. [PubMed: 18242881]
38. Williams P, Carney T, Plüddemann A, Parry CDH. Intervening to identify and reduce drug use and sexual HIV risk patterns among men who have sex with men in three provinces in South Africa. *J Subst Use.* 2014; 19:141–146.
39. Tafuma TA, Merrigan MB, Okui LA, et al. HIV/sexually transmitted infection prevalence and sexual behavior of men who have sex with men in 3 districts of Botswana: results from the 2012 biobehavioral survey. *Sex Transm Dis.* 2014; 41:480–485. [PubMed: 25013975]
40. McAdams-Mahmoud A, Stephenson R, Rentsch C, et al. Minority stress in the lives of men who have sex with men in Cape Town, South Africa. *J Homosex.* 2014; 61:847–867. [PubMed: 24392722]

41. King R, Barker J, Nakayiwa S, et al. Men at risk; a qualitative study on HIV risk, gender identity and violence among men who have sex with men who report high risk behavior in Kampala, Uganda. *PLoS ONE*. 2013; 8:e82937. [PubMed: 24358239]
42. El-Sayyed N, Kabbash IA, El-Gueniedy M. Risk behaviours for HIV/AIDS infection among men who have sex with men in Cairo, Egypt. *East Mediterr Health J*. 2008; 14:905–915. [PubMed: 19166174]
43. Taegtmeyer M, Davies A, Mwangome M, et al. Challenges in providing counselling to MSM in highly stigmatized contexts: results of a qualitative study from Kenya. *PLoS ONE*. 2013; 8:e64527. [PubMed: 23762241]
44. Aho J, Hakim A, Vuylsteke B, et al. Exploring risk behaviors and vulnerability for HIV among men who have sex with men in Abidjan, Cote d'Ivoire: poor knowledge, homophobia and sexual violence. *PLoS ONE*. 2014; 9:e99591. [PubMed: 24959923]
45. Chapman J, Koleros A, Delmont Y, Pegurri E, Gahire R, Binagwaho A. High HIV risk behavior among men who have sex with men in Kigali, Rwanda: making the case for supportive prevention policy. *AIDS Care*. 2011; 23:449–455. [PubMed: 21271402]
46. Dramé FM, Crawford EE, Diouf D, Beyrer C, Baral SD. A pilot cohort study to assess the feasibility of HIV prevention science research among men who have sex with men in Dakar, Senegal. *J Int AIDS Soc*. 2013; 16(suppl 3):18753. [PubMed: 24321115]
47. Kennedy CE, Baral SD, Fielding-Miller R, et al. "They are human beings, they are Swazi": intersecting stigmas and the positive health, dignity and prevention needs of HIV-positive men who have sex with men in Swaziland. *J Int AIDS Soc*. 2013; 16(suppl 3):18749. [PubMed: 24321112]
48. Stephenson R, Chard A, Finneran C, Sullivan P. Willingness to use couples voluntary counseling and testing services among men who have sex with men in seven countries. *AIDS Care*. 2014; 26:191–198. [PubMed: 23786340]
49. Nalá R, Cummings B, Horth R, et al. Men who have sex with men in Mozambique: identifying a hidden population at high-risk for HIV. *AIDS Behav*. 2015; 19:393–404. [PubMed: 25234252]
50. 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 Transm Dis*. 2008; 35:746–752. [PubMed: 18650772]
51. Eaton LA, Pitpitan EV, Kalichman SC, et al. Men who report recent male and female sex partners in Cape Town, South Africa: an understudied and underserved population. *Arch Sex Behav*. 2013; 42:1299–1308. [PubMed: 23519592]
52. Tucker A, Liht J, Swardt Gde, et al. An exploration into the role of depression and self-efficacy on township men who have sex with men's ability to engage in safer sexual practices. *AIDS Care*. 2013; 25:1227–1235. [PubMed: 23387517]
53. Knox, Reddy, Kaighobadi, Nel, Sandfort. Communicating HIV status in sexual interactions: assessing social cognitive constructs, situational factors, and individual characteristics among South African MSM. *AIDS Behav*. 2013; 17:350–359. [PubMed: 23065127]
54. Stephenson R, Hast M, Finneran C, Sineath CR. Intimate partner, familial and community violence among men who have sex with men in Namibia. *Cult Health Sex*. 2014; 16:473–487. [PubMed: 24735113]
55. Rebe K, Lewis D, Myer L, et al. A cross sectional analysis of gonococcal and chlamydial infections among men-who-have-sex-with-men in Cape Town, South Africa. *PLoS ONE*. 2015; 10:e0138315. [PubMed: 26418464]
56. Park JN, Papworth E, Kassegne S, et al. HIV prevalence and factors associated with HIV infection among men who have sex with men in Cameroon. *J Int AIDS Soc*. 2013; 16(suppl 3):18752. [PubMed: 24321114]
57. Elst EM, Van der, Mbogua J, Operario D, et al. High acceptability of HIV pre-exposure prophylaxis but challenges in adherence and use: qualitative insights from a phase I trial of intermittent and daily PrEP in at-risk populations in Kenya. *AIDS Behav*. 2013; 17:2162–2172. [PubMed: 23080358]
58. Okal J, Luchters S, Geibel S, Chersich MF, Lango D, Temmerman M. Social context, sexual risk perceptions and stigma: HIV vulnerability among male sex workers in Mombasa, Kenya. *Cult Health Sex*. 2009; 11:811–826. [PubMed: 19484638]

59. Lorway R. Dispelling “heterosexual African AIDS” in Namibia: same-sex sexuality in the township of Katutura. *Cult Health Sex.* 2006; 8:435–449. [PubMed: 16923647]
60. Collier KL, Sandfort T, Reddy V, Lane T. “This will not enter me”: painful anal intercourse among black men who have sex with men in South African Townships. *Arch Sex Behav.* 2014; 44:317–328. [PubMed: 25257257]
61. Okall DO, Otieno FO, Nyikuri M, et al. Men who have sex with men in Kisumu, Kenya: support group membership and knowledge of HIV-risk factors. *Cult Health Sex.* 2013; 15:968–980. [PubMed: 23767414]
62. Musinguzi G, Bastiaens H, Matovu JK, et al. Barriers to condom use among high risk men who have sex with men in Uganda: A qualitative study. *PLoS ONE.* 2015; 10:e0132297. [PubMed: 26172374]
63. Baral S, Adams D, Lebona J, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in Lesotho. *J Int AIDS Soc.* 2011; 14:36. [PubMed: 21726457]
64. Siegler AJ, Voux A, Phaswana-Mafuya N, et al. Elements of condom-use decision making among South African men who have sex with men. *J Int Assoc Provid AIDS Care.* 2014; 13:414–423. [PubMed: 24935692]
65. McKinnon LR, Gakii G, Juno JA, et al. High HIV risk in a cohort of male sex workers from Nairobi, Kenya. *Sex Transm Infect.* 2013; 90:237–242. [PubMed: 24337729]
66. Hladik W, Barker J, Ssenkusu JM, et al. HIV infection among men who have sex with men in Kampala, Uganda--a respondent driven sampling survey. *PLoS ONE.* 2012; 7:e38143. [PubMed: 22693590]
67. Hakim A, Aho J, Semde G, et al. The Epidemiology of HIV and Prevention Needs of Men Who Have Sex with Men in Abidjan, Cote d'Ivoire. *PloS ONE.* 2014; 10:e0125218.
68. Baral SD, Ketende S, Mnisi Z, et al. A cross-sectional assessment of the burden of HIV and associated individual- and structural-level characteristics among men who have sex with men in Swaziland. *J Int AIDS Soc.* 2013; 16(suppl 3):18768. [PubMed: 24321117]
69. Mutua G, Sanders E, Mugo P, et al. Safety and adherence to intermittent pre-exposure prophylaxis (PrEP) for HIV-1 in African men who have sex with men and female sex workers. *PLoS ONE.* 2012; 7:e33103. [PubMed: 22511916]
70. Gebreyesus SH, Mariam DH. Assessment of HIV/AIDS-related risks among men having sex with men (MSM) in Addis Ababa, Ethiopia. *J Public Health Policy.* 2009; 30:269–279. [PubMed: 19806068]
71. Heusser S, Elkonin D. Childhood sexual abuse and HIV sexual-risk behaviour among men who have sex with men in South Africa. *S Afr J Psychol.* 2013; 44:83–96.
72. Ehlers VJ, Zuyderduin A, Oosthuizen MJ. The well being of gays, lesbians and bisexuals in Botswana. *J Adv Nurs.* 2001; 35:848–856. [PubMed: 11555032]
73. Zahn R, Grosso A, Scheibe A, et al. Human rights violations among men who have sex with men in Southern Africa: Comparisons between legal contexts. *PLoS ONE.* 2016; 11:e0147156. [PubMed: 26764467]
74. Nyoni JE, Ross MW. Condom use and HIV-related behaviors in urban Tanzanian men who have sex with men: a study of beliefs, HIV knowledge sources, partner interactions and risk behaviors. *AIDS Care.* 2013; 25:223–229. [PubMed: 22788911]
75. Adebajo S, Obianwu O, Eluwa G, et al. Comparison of audio computer assisted self-interview and face-to-face interview methods in eliciting HIV-related risks among men who have sex with men and men who inject drugs in Nigeria. *PLoS ONE.* 2014; 9:e81981. [PubMed: 24416134]
76. Johnston LG, Holman A, Dahoma M, et al. HIV risk and the overlap of injecting drug use and high-risk sexual behaviours among men who have sex with men in Zanzibar (Unguja), Tanzania. *Int J Drug Policy.* 2010; 21:485–492. [PubMed: 20638262]
77. 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, and Botswana. *PLoS ONE.* 2009; 4:e4997. [PubMed: 19325707]

78. Vuylsteke B, Semde G, Sika L, et al. High prevalence of HIV and sexually transmitted infections among male sex workers in Abidjan, Cote d'Ivoire: need for services tailored to their needs. *Sex Transm Infect.* 2012; 88:288–293. [PubMed: 22328644]
79. Cloete, Simbayi LC, Kalichman SC, Strebel, Henda. Stigma and discrimination experiences of HIV-positive men who have sex with men in Cape Town, South Africa. *AIDS Care.* 2008; 20:1105–1110. [PubMed: 18608067]
80. Strömdahl S, Williams AO, Eziefule B, et al. Associations of consistent condom use among men who have sex with men in Abuja, Nigeria. *AIDS Res Hum Retroviruses.* 2012; 28:1756–1762. [PubMed: 22574699]
81. Lorway R. “Where can I be deported?” Thinking through the “Foreigner Fetish” in Namibia. *Med Anthropol.* 2008; 27:70–97. [PubMed: 18266172]
82. World Health Organization. Global Status Report on Alcohol and Health. Geneva: World Health Organization; 2014.
83. United Nations Office of Drugs and Crime. World Drug Report. New York: United Nations; 2014.
84. Pitpitani EV, Kalichman SC, Eaton LA, Watt MH. Men (and women) as “Sellers” of sex in alcohol-serving venues in Cape Town, South Africa. *Prev Sci.* 2014; 15:296–308. [PubMed: 23494405]
85. Dunkle KL, Jewkes RK, Brown HC, Gray GE. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Soc Sci Med.* 2004; 59:1581–1592. [PubMed: 15279917]
86. Watt MH, Aunon FM, Skinner D, Sikkema KJ. “Because he has bought for her, he wants to sleep with her”: Alcohol as a currency for sexual exchange in South African drinking venues. *Soc Sci Med.* 2012; 74:1005–1012. [PubMed: 22326304]
87. Room R. Intoxication and bad behaviour: understanding cultural differences in the link. *Soc Sci Med.* 2001; 53:189–198. [PubMed: 11414386]
88. Kuendig H, Plant MA, Plant ML, Miller P. Alcohol-related adverse consequences: cross-cultural variations in attribution process among young adults. *Eur J Public Health.* 2008; 18:386–391. [PubMed: 18287104]
89. Hunt G, Barker JC. Socio-cultural anthropology and alcohol and drug research: towards a unified theory. *Soc Sci Med.* 2001; 53:165–166. [PubMed: 11414385]
90. Padilla MB, Guilamo-Ramos V. A syndemic analysis of alcohol use and sexual risk behavior among tourism employees in Sosua, Dominican Republic. *Qual Health Res.* 2012; 22:89–102. [PubMed: 21859907]
91. Obot I. Africa faces a growing threat from neo-colonial alcohol marketing. *Addict.* 2015; 110:1371–1372.
92. Borges C, Dias S, Babor T, Esser MB, Parry CDH. Alcohol and public health in Africa: can we prevent alcohol related harm from increasing? *Addict.* 2015; 110:1373–1379.
93. Finneran C, Chard A, Sineath C, Sullivan P, Stephenson R. Intimate partner violence and social pressure among gay men in six countries. *West J Emerg Med.* 2012; 13:260–271. [PubMed: 22900124]
94. Geibel S, Tun W, Tabsoba P, Kellerman S. HIV vulnerability of men who have sex with men in developing countries: Horizons Studies, 2001–2008. *Public Health Rep.* 125:316–324.
95. Nelson LE, Wilton L, Agyarko-Poku T, et al. The association of HIV stigma and HIV/STD knowledge with sexual risk behaviors among adolescent and adult men who have sex with men in Ghana, West Africa. *Res Nurs Health.* 2015; 38:194–206. [PubMed: 25809638]
96. Niang C, Tabsoba 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.
97. Sandfort T, Yi HS, Knox J, Reddy V. Sexual partnership types as determinant of HIV risk in South African MSM: An event-level cluster analysis. *AIDS Behav.* 2013; 17:S23–S32. [PubMed: 22956229]
98. Stahlman S, Grosso A, Ketende S, et al. Characteristics of men who have sex with men in southern Africa who seek sex online: a cross-sectional study. *J Med Internet Res.* 2015; 17:e129. [PubMed: 26006788]

Fig. 1.
Retrieval and Selection Process of Studies about Substance Use (Alcohol and Drugs) among MSM in Africa for the Systematic Review.

Table 1Assessment of Alcohol Use and Prevalence of Alcohol Use ¹

Authors	Alcohol Assessment	Prevalence/Frequency of Alcohol Use
Aho (2014) ⁴⁴	Alcohol consumption in past 30 days (never, once a week or less, more than one a week)	Never: 32.4% Once a week or less: 18.4% More than once a week: 49.1%
Baral, Adams (2011) ⁶³	Short, structured survey instrument (no questions/scale specified)	33.8% reported drinking alcohol more than 5 days per month
Baral (2013) ⁶⁸	In the last 30 days, how many days did you drink at least one drink of alcohol? (none/at least one day)	63.9%
Chapman (2011) ⁴⁵	Daily drinking in preceding month (no question specified)	22% reported drinking alcohol every day in the prior month to interview.
Dramé (2013) ⁴⁶	Not specified	Not specified
Eaton (2013) ⁵¹	<ul style="list-style-type: none"> How often do you have a drink containing alcohol (never - more than 4 times a week) How many drinks containing alcohol do you have on a typical day when you are drinking (I don't drink - 10 or more) 	<ul style="list-style-type: none"> >2-3 times a week 47.2% <2-3 times a week 52.8% >5 49.7% <5 50.3%
Ehlers (2001) ⁷²	Not specified	63.8% reported having 2 or more alcohol drinks per day
El-Sayyed (2008) ⁴²	Self-reported alcohol use (no questions/scale specified)	1.4%
Geibel (2008) ⁵⁰	Number of days per week alcohol is consumed	Median: 2 days per week (IQR = 0 – 3)
Graham (2013) ³³	No questions specified	62.0% of MSM reported alcohol use
Hakim (2015) ⁶⁷	Frequency of alcohol use per week	More than once per week 18.4% Once a week or less 49.1% Never: 32.4%
Hladik (2012) ⁶⁶	Alcohol use within the past 30 days	Once a week: 8.3% At least once a week: 43.8% About every day: 18.3%
Kim (2015) ³¹	Alcohol use in past 30 days	About every day: 17.9% At least once a week: 43.8% Less than once a week: 10.2 None: 28.1
King (2013) ⁴¹	Not specified	100% reported ever alcohol use
Lane (2009) ²³	AUDIT	At least once/month: 87.9% 10+ drinks on a single day: 54.5% Problem drinking: 75.9%
Lane (2014) ²⁴	AUDIT-C	Most of the sample met AUDIT-C criteria for alcohol misuse Never drinking 6+ drinks in a typical setting Site 1: 17.4% Site 2: 41.3% Approximately 1/3 of MSM reported typically drinking 6+ drinks in one sitting at least twice a month.
Lane (2008) ³⁰	<ul style="list-style-type: none"> During the last 4 weeks, how often have you had drinks containing alcohol? How often would you say you were drunk? 	<ul style="list-style-type: none"> 78% Among MSM reporting anal sex with a man in the past 6 months (n = 147): 36.1% infrequent or non-drinkers 23.8% regular drinkers 40.1% regularly drinks to intoxication
McAdams-Mahmoud (2014) ⁴⁰	Not specified	50% reported using alcohol
McKinnon (2014) ⁶⁵	Current alcohol use (not further specified)	74.8% (77.0% among HIV-negative MSM SW and 71.4%.among HIV-positive MSM SW)

Authors	Alcohol Assessment	Prevalence/Frequency of Alcohol Use
Mugo (2015) ³⁵	Any alcohol use past or preceding month	54% and 69% average event rate per month for 114 and 126 follow up months for daily and intermittent PrEP users, respectively
Muraguri (2015) ³²	AUDIT	Possible alcohol dependence: 22.7% Among MSM who did sell sex 22.6% Among MSM who did not sell sex 22.7%
Nalá (2015) ⁴⁹	AUDIT-C	Drank alcohol in past year: Maputo: 78.2% Beira: 61.8% Nampula/Nacala: 59.4% Problem drinkers (≥ 4 points on AUDIT-C): Maputo: 43.7 % Beira: 43.8 % Nampula/Nacala: 32.3 %
Nyoni (2013) ⁷⁴	Drinking once a week or more (no time frame specified)	60%
Okal (2009) ⁵⁸	Standardized interview guide with open-ended questions	N/A
Okall (2013) ⁶¹	Whether alcohol is an HIV risk factor (qualitative interviews)	N/A
Polders (2008) ³⁴	<ul style="list-style-type: none"> I consider myself a (teetotaler, alcohol user, alcohol abuse, alcoholic) I drink alcohol (never, almost never, twice a week or less, three times a week or more, every day) I get drunk (never, almost never, twice a week or less, three times a week or more, every day) 	Not reported
Sanders (2013) ¹⁶	Use of alcohol in preceding month	64.4% (65.6% MSMW, 58.4% MSM only)
Sandfort (2015) ²¹	AUDIT	Hazardous drinkers: 44.4%
Tafuma (2014) ³⁹	Alcohol use in last month	82.5%
Wade (2005) ¹²	Alcohol consumption during last week; dichotomized in analyses (any/none)	17.9%
Williams (2014) ³⁸	Most commonly used substances in past 90 days	89.8% (most commonly used substance in past 90 days)

¹ Only studies that reported how alcohol use was assessed or the prevalence of alcohol use are included.

Table 2Alcohol Use in Association with Engaging in Sex: Assessment and Prevalence¹

Authors	Assessment	Prevalence/Frequency of Alcohol Use in Association with Engaging in Sex
Aho (2014) ⁴⁴	Alcohol consumption before sex with last male partner	Always: 9.5% Sometimes: 38.5% Never: 52.0%
Hakim (2015) ⁶⁷	Alcohol use before sex with last male partner	Always: 9.5% Sometimes: 38.5% Never: 52.0%
Heusser (2014) ⁷¹	Whether any drugs, alcohol, or both were used in a sexual context in the past 6 months	Not reported
Kim (2015) ³¹	Drank alcohol before sex	Alcohol use before sex: 47.2%
Knox (2013) ⁵³	Whether drugs or alcohol were used at last sexual encounter (no specific alcohol question)	41.5%
Musinguzi (2015) ⁶²	Alcohol use before sex (semi-structured interview)	N/A
Mutua (2012) ⁶⁹	Drank alcohol before sex	47%
Park (2013) ⁵⁶	Whether sexual intercourse ever took place after consuming alcohol	66.1%
Price (2012) ¹⁷	Having sex while under the influence of alcohol or drugs (no specific question reported)	Sex under influence of alcohol : Kilifi, Kenya: 66.5% Nairobi, Kenya: 77.5% Cape Town, South Africa: 47.3%
Rebe (2015) ⁵⁵	Sex under influence of alcohol (ever)	69%
Rispel (2011) ¹⁹	Not specified	Sex in the preceding 12 months while under the influence of alcohol: 73.4%
Sandfort (2013) ⁹⁷	Whether drugs or alcohol were used at last sexual encounter (no specific alcohol question)	41%
Siegler (2014) ⁶⁴	Not specified	33% mentioned having had sex while intoxicated
Strömdahl (2012) ⁸⁰	Not specified	Had sex under influence of alcohol: 59.3%
Tafuma (2014) ³⁹	Six or more drinks before anal sex in the last week	43.1% of those who drank alcohol drunk 6 or more drinks before anal sex in the last week
Tucker (2013) ⁵²	Alcohol use 2 hours prior to sex (yes/no)	Not reported
Van der Elst (2013) ⁵⁷	Alcohol use before sex	47% ^a
Williams (2014) ³⁸	Most commonly used substances during sex	42.6% (second most commonly used substance during sex, after cannabis)

¹ Only studies that reported how alcohol use in association with having sex was assessed are included.

^a All 72 participants were part of a PrEP trial; sample included 5 female sex workers.

Table 3Drug Use in Association with Engaging in Sex: Assessment and Prevalence^I

Authors	Assessment	Prevalence/Frequency of Drug Use in Association with Engaging in Sex
Heusser (2014) ⁷¹	Whether any drugs, alcohol, or both were used in a sexual context in the past 6 months	35.2%
Knox (2013) ⁵³	Whether drugs or alcohol were used at last sexual encounter (no specific drug question)	45.1%
Musinguzi (2015) ⁶²	Qualitative interviews: Drug use before sex	N/A
Nelson (95) ⁹⁵	Drug use in past 3 and past 12 months	Past 3 months: 9% Past 12 months: 7%
Okall (2013) ⁶¹	Qualitative interviews: Thinking drugs are HIV risk factors	N/A
Park (2013) ⁵⁶	Whether sexual intercourse ever took place after using drugs	8.4%
Rebe (2015) ⁵⁵	Sex under the influence of drugs ever and in past 6 months & ever crystal meth	53% ever sex under the influence of drugs (37% ever sex under the influence of crystal meth)
Rispel (2011) ¹⁹	Not specified	11.6% sex under the influence of drugs in the preceding 12 months
Sandfort (2013) ⁹⁷	Whether drugs or alcohol were used at last sexual encounter (no specific drug question)	41%
Strömdahl (2012) ⁸⁰	Not specified	31.4% had sex under influence of drugs
Tucker (2013) ⁵²	Drug use 2 hours prior to sex (Yes/No)	19.7% – 40.6% ^a
Williams (2014) ^{38b}	Most commonly used substances during sex	Cannabis: 65.7% Methamphetamine: 12.7% Heroin: 2.6% Cocaine: 3.0% Ecstasy: 7.4% Methaqualone: 3.3% Amylbutyl nitrate: 4.7% Methcathinone: 0.7%

^I Only studies that reported how drug use in association with sex was assessed or its prevalence are included.^a 40.6% among those who reported UAI in past 6 months and 19.7% among those who did not report UAI in past 6 months.^b Sample consisted of substance using MSM.