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Sexual behaviours and risk with women in MSM in sub-Saharan Africa

Marion Fiorentino^a, Nathan Yanwou^{a,b},
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In sub-Saharan Africa (SSA), MSM – a high HIV prevalence group – experience strong social stigma and pressure to have female partners. Accordingly, they could constitute a bridging group for HIV transmission to cisgender women. We developed a multilevel summary of MSM sexual behaviors and risk with women in various SSA regions. Following PRISMA guidelines, we conducted a mixed-method systematic review of data of sex with women in MSM in SSA. We performed meta-analyses on quantitative data (i.e. percent of recent sex and condomless sex with women) for each SSA region (when proportions reported in ≥ 4 studies). Pooled proportions were calculated using random-effects models. Qualitative data were analyzed using the three-step thematic synthesis methodology. The pooled proportion of MSM who had sex with women was 58% (33–83%) in East Africa (in the previous 3 months), and 27% (13–48%) in Southern Africa and 50% (95% CI 39–62%) in West Africa (in the previous 6 months); 23% (16–32%) of MSM in West Africa had condomless sex with a woman (during the most recent encounter). Approximately one quarter of MSM had recent multiple female partners. MSM reported having sex with women because of heteronormative pressure, erotic/romantic attraction, or financial needs leading to transactional sex. MSM may act as a bridging population to women in SSA, as they commonly practice sex with women and risky sexual behaviors with them. HIV programmes and community-based support for MSM should be adapted to this population to reduce this risk.

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Introduction

In 2022, sub-Saharan Africa (SSA) – which comprises Central, East, Southern, and West Africa – had 25.6 million people with HIV (PWH), accounting for 66% of

all PWH worldwide [1]. In the rest of the world, HIV epidemics are mostly concentrated in key populations (i.e. sex workers, people who inject drugs, MSM, and transgender women), with prevalence generally below 1% in the general population. In contrast, in East and

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Southern Africa, the HIV epidemic is considered generalized, with prevalence in the general population ranging from 5 to 30%, with key populations accounting for only 14% of new infections in 2020. In West and Central Africa, the HIV epidemic is generally considered mixed with HIV prevalence in the general population ranging from 1 to 5%, while key populations accounted for 45% of new infections in 2020 [1–4]. These figures highlight the need to investigate the risk of HIV bridging from key populations to the general population in SSA.

HIV prevalence in MSM in East/Southern Africa and in West/Central Africa is 18 and 25%, respectively [5], and they account for 4 and 14% of new infections [4]. High levels of discrimination and internalized and social stigma jeopardize this population's access to healthcare and prevention services. As a result, they engage in increased HIV risk behaviors [6–12], and are pressured to have sex with cisgender women. MSM who have sex with cisgender women (MSMW) may contribute to the HIV epidemics in women. Indeed, women and girls account for the highest proportion of HIV incidence in SSA (63% in East/Southern Africa, 58% in West/Central Africa) [1].

The present synthesis aimed to provide a multilevel summary of recent sexual behaviors of MSM with women in MSM in the four regions of SSA, by reporting insights into both the HIV transmission bridging risk between MSMW and women, and the related psychosocial and behavioral factors. Data from the present synthesis originated from a large-scale mixed-method systematic review about male bisexuality in SSA.

Methods

Large-scale mixed-method systematic review

Scope, protocol and monitoring

We conducted a systematic review to collect, as exhaustively as possible, data (qualitative and quantitative) on male bisexuality in SSA, including the following: the proportion and characteristics of self-identified bisexual men or MSM who declared having female partners (lifetime, recent), their social and sexual behaviors with women, the psychosocial context of male bisexuality, HIV/STI epidemic dynamics between MSM and women, and the gaps in and recommendations for HIV research and prevention for MSM and their female partners, and so forth. The protocol of this systematic review was established according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [13] and prospectively registered in PROSPERO in April 2021 (CRD42021237836) [14]. A steering committee involving five public health researchers (A.E., C.L., P.R., B.S., M.F.) was constituted to monitor the systematic review process.

Literature search strategy

A concept table was developed to define the keywords to enter in English and French in six databases: PubMed, EMBASE, PsycINFO, Web of Science Core collection, Google Scholar, CAIRN (see details of systematic review steps in Supplemental File 1, <http://links.lww.com/QAD/D48>). Records were exported to the Covidence systematic review software tool (Veritas Health Innovation, Melbourne, Australia) [15].

Literature screening and assessment for eligibility

Article selection first comprised article title and abstract screening, followed by full-text assessment for eligibility. This was performed independently by two investigators (N.Y., M.F.) using Covidence, with decision trees that had been previously generated. Investigators held weekly meetings to resolve any discordance. Irrespective of their publishing date, inclusion criteria, research study design, determinants, implications, and topics investigated (public health, phylogenetics, psychology, rights, etc.), all peer-reviewed articles, PhD theses, and scientific reports (hereafter 'articles') were eligible if they provided information about male bisexuality in SSA, or its determinants and implications.

Data extraction

We developed a standardized data extraction form in Covidence to extract data from eligible articles. In most cases, each eligible article reflects one study. However, prior to extraction, articles using data from the same dataset were identified (research generating more than one article), merged in the Covidence software and considered as a single study, in order to avoid duplicate information. Inversely, a single article could be derived into more than one studies in some cases (Supplemental File 1, <http://links.lww.com/QAD/D48>).

Multilevel summary of recent sex and risky sexual behaviors with female partners in MSM

Quantitative data synthesis

Data selection and management For the present synthesis, using the systematic review database, we selected quantitative data on recent (i.e. in the 12 months or less prior to the relevant study) sexual behaviors with cisgender women in MSM from cross-sectional studies and baseline data from longitudinal studies of MSM. These data included:

- (i) Proportion (in %) of MSM who recently had sex with (a) cisgender woman (women)
- (ii) Proportion (in %) of MSM who recently practiced HIV risky sexual behaviors with (a) woman (women) [16,17] defined as condomless sex (understood here as inconsistent condom use over a period of time, or condomless at most recent sexual encounter), anal sex, condomless anal sex, transactional sex (i.e. bought or sold), or multiple female partners

- (iii) Mean or median number of recent female sexual partners

Studies with quantitative data about male bisexuality from our large-scale systematic review, but that did not contain the above data (i, ii, or iii) were excluded from the present synthesis.

Meta-analyses Meta-analyses were performed separately for each SSA region (i.e. West, Central, East, and Southern Africa), if data for a given sexual behavior over a given time period were available from at least four studies. We used the random-effects model estimated by the DerSimonian and Laird method [18] to calculate pooled proportions of sexual behaviors with women in MSM. In order to accurately estimate the pooled proportion [19], the logit transformation was applied to observed proportions in order to yield a normal distribution when the observed proportions or the boundaries of the confidence interval were less than 0.2 or greater than 0.8 for more than 20% of the studies [20,21]. The random-effects model was also used to create forest plots.

Heterogeneity was quantified by the I^2 parameter [22]. If I^2 was larger than 75%, identification of outlying studies with influence on the overall effect size was performed using three methods: a Baujat plot [23], screening for externally studentized residuals [21,24], and a leave-one-out analysis [19]. A study was considered an outlier if it was identified by all three methods. It was definitively dropped from the meta-analysis if its exclusion led to a gain of at least 10 points in heterogeneity. No moderator analysis was performed for these data if not enough studies were available (at least 10 studies) [19]. Egger's regression test and visual inspection of funnel plots for asymmetry were used to assess publication bias. Two-sided statistical tests were performed with a P value 0.05 or less being considered statistically significant. Statistical analyses were performed using RStudio software (v. 4.2.0). A synthesis of the data excluded from the meta-analyses is presented.

Qualitative data synthesis

From the systematic review database, only qualitative data (verbatim quotations from interviews and focus groups with MSM) specifically related to sex between MSM and women were imported into the NVivo software package (v 1.7.1). The data were analyzed using the three-step thematic synthesis methodology for qualitative research in systematic reviews [25]. Specifically, sentences were first inductively coded 'line-by-line', in order to capture their content and meaning. Second, new codes (hereafter 'descriptive themes') were created to group the initial codes according to their similarities and differences in a hierarchical coding tree. Finally, 'analytical themes' emerged from the interpretation of the 'descriptive themes'.

Results

Flow of included studies and selected data

For the large-scale mixed-method systematic review, 5098 articles were identified through the database search. After automatic removal of duplicates, the titles and abstracts of the remaining 3348 articles were screened (Fig. 1). Of these, the full texts of the 1365 remaining articles were assessed, resulting in 380 eligible articles (i.e. reporting any kind of data related to male bisexuality in SSA). Finally, data from 277 studies were extracted for the large-scale systematic review.

Of these, only the 87 studies containing qualitative data or behavioral quantitative data referring to recent sexual relationships of MSM with women were selected for the present synthesis [26–118]. Details of selected studies are presented in Supplementary File 2, <http://links.lww.com/QAD/D49>. These studies provided data for 25 countries of SSA. Fifty-seven percentage of studies provided data collected in 2010 or later.

Quantitative data synthesis

Recent sex with female partners

Fifty-seven studies provided proportions of MSM who had recent sex with at least one cisgender woman for different time periods depending on the study (in the previous month, 3, 6, or 12 months, Table 1). Six meta-analyses were performed. In West Africa (Fig. 2a), the pooled proportions of MSM who had sex with female partners in the previous 6 and 12 months were 47% (95% CI 36–58%, $n = 8$ studies, 3749 MSM), and 50% (39–62%, $n = 5$ studies, 1708 MSM), respectively. In East Africa (Fig. 2b), the pooled proportion of MSM who had sex with female partner(s) in the previous 3 months was 58% (33–83%, $n = 5$ studies, 3224 MSM), whereas in Southern Africa (Fig. 2c), the proportions for the previous 12 and 6 months were 29% (22–38%, $n = 6$ studies, 1442 MSM), and 27% (13–48%, $n = 10$ studies, 3350 MSM), respectively. Heterogeneity was high ($>75\%$) in all meta-analyses. There were not enough data available on Central Africa to perform a meta-analysis. However, studies showed that the proportions of MSM who had sex with female partner(s) in the previous 12 and 6 months there ranged from 33 to 50% (Table 1).

Condomless sex with female partners

Twenty-two studies provided percentages of MSM who had condomless sex with female partners (vaginal, vaginal/anal, or not specified) across various time periods (in the previous month, 6 months, or 12 months, or during most recent sex with a female partner, Table 2). According to our present study criteria, only a meta-analysis for West Africa was possible; the pooled proportion for condomless sex during the most recent encounter was 23% (16–32%, $n = 8$ studies, 4045 MSM) (Fig. 3). In East and Southern Africa, the proportion

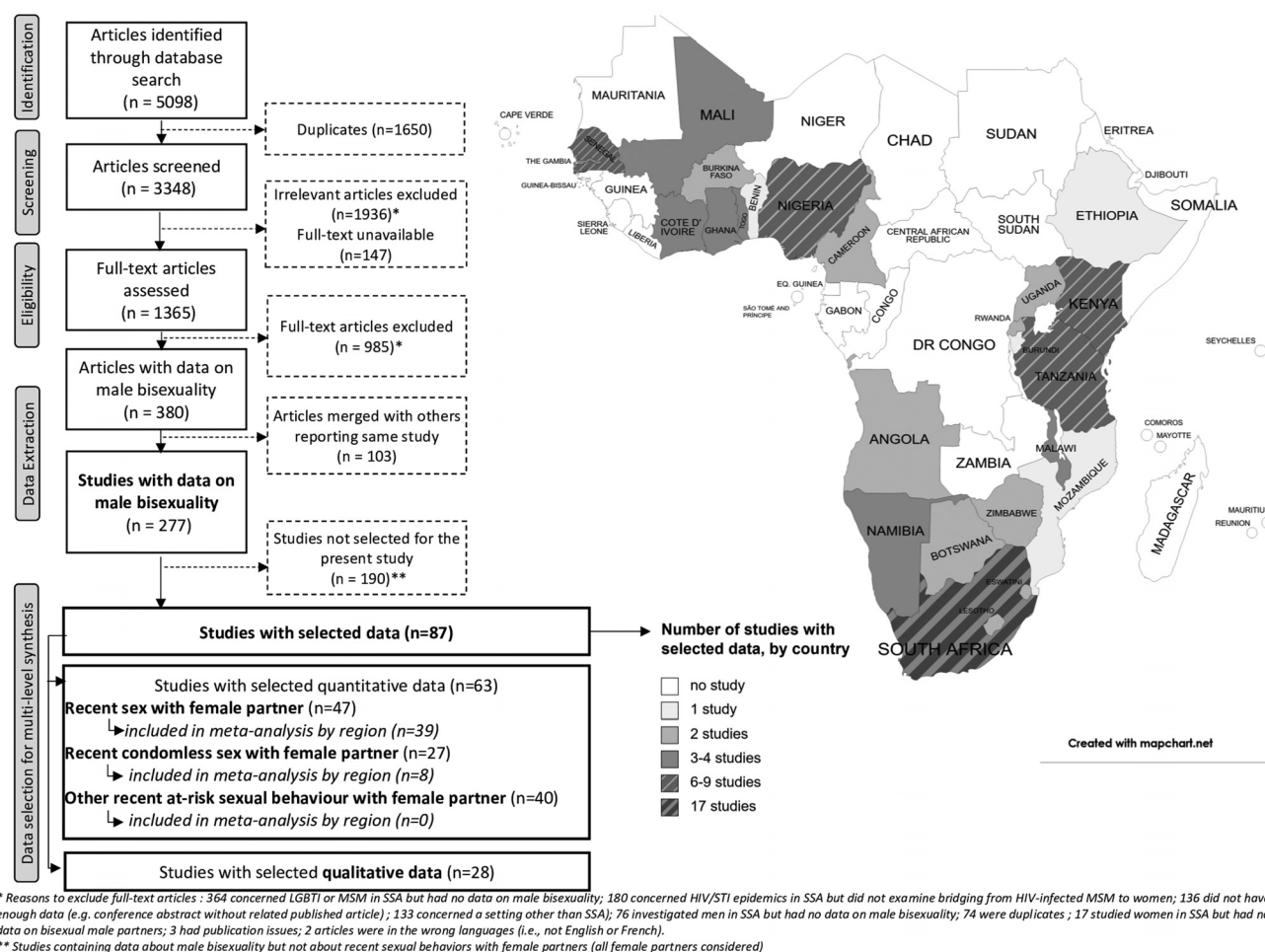


Fig. 1. PRISMA flow chart of articles and map of selected studies.

ranged between 18–88 and 32–33%, respectively (Table 2).

Multiple female partners

The mean number of female partners in the 6 months prior to studies in West and Southern Africa ranged from 0.5 to 2.4 (Table 3).

In West Africa studies, 14–35% and 8–29% of MSM reported at least two and at least three female partners (in the previous month, 6 months or 12 months depending on the study), respectively, while in one study, 18% had at least four female partners in the previous 12 months (Table 3). Studies in East Africa and in Southern Africa indicated that 26–38% and 9–22% of MSM reported at least three female partners (in the previous 3 or 12 months, depending on the study), respectively.

Anal sex and condomless anal sex with female partners

In West and Southern Africa, 8–22% of MSM reported having anal sex with a female partner in the previous 6 or 12 months (Table 3). The proportion of MSM who had condomless anal sex with female partners ranged from 2

to 52% in West Africa, and from 3 to 11% in East and Southern Africa (in the previous 3, 6 or 12 months).

Transactional sex with female partners

In West Africa studies, the proportion of MSM reporting recent transactional sex (i.e. bought or sold) with a female partner ranged from 0.3 to 21% (study-dependent and time-dependent), whereas in one study in East Africa, 36% of MSM reported they had bought sex in the previous month (Table 3).

Nondisclosure of HIV-positive status to female partners

In a study in Western Africa, 38% of HIV-positive MSM had female partners with whom they did not disclose their HIV status (Table 3).

Qualitative data synthesis

Of the 87 studies selected for the present synthesis, 28 contained qualitative data of interest (Fig. 1, Supplementary File 2, <http://links.lww.com/QAD/D49>). Two analytical themes emerged from the thematic synthesis, which are described below with selected quotes from the

Table 1. Summary of studies reporting percent of MSM having had recent sex with female partners.

SSA region	Study country (first author, publication year)	MSM sample size	Recent sex with female partners in MSM			Included in meta analyses
			Timeframe ^a	Value	Unit	
West	Burkina Faso (Ouedraogo, 2019) [26]- Ouagadougou	333	Previous 12m	45	RDS w. %	Fig. 2a
	-Bobo-Dioulasso	328		52	RDS w. %	Fig. 2a
	Cote d'Ivoire (Aho, 2014) [27]	601		56	RDS w. %	Fig. 2a
	Nigeria (Adebajo, 2012) [28]	1125		51	%	Fig. 2a
	Senegal (Wade, 2005) [29]	463		74	%	Fig. 2a
	Senegal (Ndiaye, 2011) [30]	49		31	%	Fig. 2a
	Togo (Teclessou, 2017) [31]	496		24	%	Fig. 2a
	Togo (Ruiñeñor-Escudero, 2019) [32]	354		42	RDS w. %	Fig. 2a
	Burkina, Mali, Cote d'Ivoire, Togo (Coulaud, 2020) [33]	621	Previous 6m	42	%	Fig. 2a
	Ghana (Nelson, 2015) [34]	137		33	%	Fig. 2a
	Mali (Lahuerta, 2018) [35]	552		53	%	Fig. 2a
	Nigeria (Strömdahl, 2012) [36]	297		67	%	Fig. 2a
	Nigeria (Tobin-West, 2017) [37]	101		56	RDS w. %	Fig. 2a
	Cote d'Ivoire (Moran, 2020) [38]	1301	Previous 1m	52	%	Fig. 2a
	Senegal (Wade, 2010) [39]	440		34	%	
Central	Cameroon (Billong, 2013) [40]	239	Previous 12m	50	%	
	Cameroon (Park, 2013) [41]	511		46	%	
	Cameroon (Henry, 2010) [42]	142	Previous 6m	49	%	
East	Burundi (Coulaud, 2016) [43]	51	Previous 1m	33	%	
	Kenya (Granderson, 2019) [44]	391	Previous 12 m	47	%	
	Rwanda (TwahirwaRwema, 2020) [45]	736		38	RDS w. %	
	Tanzania (Ishungisa, 2020) [46]	777		51	%	
	Kenya (Shangani, 2017) [47]	89	Previous 6 m	0	%	
	Kenya (Kimani, 2019) [48]	168		67	%	
	Uganda (Hladik, 2017) [49]	608		47	RDS w. %	
	Kenya (Neme, 2015) [50]	852	Previous 3m	79	%	Fig. 2b
	Kenya (Fearon, 2020) [51]	618		28	%	Fig. 2b
	Kenya (Smith, 2021) [52]	592		26	%	Fig. 2b
	Tanzania (Mmbaga, 2017) [53]	409		77	%	Fig. 2b
	Tanzania (Mmbaga, 2018) [54]	753		79	%	Fig. 2b
	Kenya (Onyango-Ouma, 2005) [55]	500	Previous 1m	14	%	
	Kenya (Geibel, 2012) [56]	500		5	%	
	Tanzania (Kigumiu, 2019) [57]	266	Current partner	12	%	
Southern	Tanzania (Mmbaga, 2020) [58]	753		55	%	
	Malawi (Wirtz, 2013) [59]	338	Previous 12m	32	%	Fig. 2c
	Namibia (Russell, 2019) [60]	94		49	%	Fig. 2c
	South Africa (Middelkoop, 2014) [61]	194		23	%	Fig. 2c
	South Africa (Müller, 2016) [62]	200		22	%	Fig. 2c
	South Africa (Sullivan, 2020) [63]	292		20	%	Fig. 2c
	Swaziland (Baral, 2013) [64]	324		36	%	Fig. 2c
	Angola (Kendall, 2014) [65]	351	Previous 6m	14	%	Fig. 2c
	Angola (Herce, 2018) [66]	713		80	%	Fig. 2c
	Botswana (Tafuma, 2014) [67]	454		38	RDS w. %	Fig. 2c
	Malawi, Namibia, Botswana (Beyrer, 2010) [68]	516		54	%	Fig. 2c
	South Africa (Baral, 2011) [69]	200		17	%	Fig. 2c
	South Africa (Lane, 2011) [70]	378		61	RDS w. %	Fig. 2c
	South Africa (Batist, 2013) [71]	98		26	%	Fig. 2c
	South Africa (Lane, 2014) [72] – Gert Sibande	307		8	RDS w. %	Fig. 2c
SSA	Elhanzeni	298		2	%	Fig. 2c
	Swaziland (Sithole, 2017) [73]	35		23	%	Fig. 2c
	Malawi (Herce, 2018) [74]	123	Previous 3m	77	%	Fig. 2c
	Mozambique_Maputo (Cummings, 2018) [75]	496		76	RDS w. %	Fig. 2c
	Mozambique_Beira (Cummings, 2018) [76]	583		42	RDS w. %	Fig. 2c
	South Africa (Maenetje, 2019) [77]	27		22	%	Fig. 2c
	South Africa (Fearon, 2020) [51]	301		32	%	Fig. 2c
	Lesotho (Baral, 2011) [76]	252	Current partner	44	%	
	South Africa (Alcala-Alezones, 2018) [77]	480		12	%	
	Online, 22 countries (Isano, 2020) [78]	297	Previous 6m	27	%	

^a12 m, 6m, 3m, 1m: 12, 6, 3, 1 month(s).

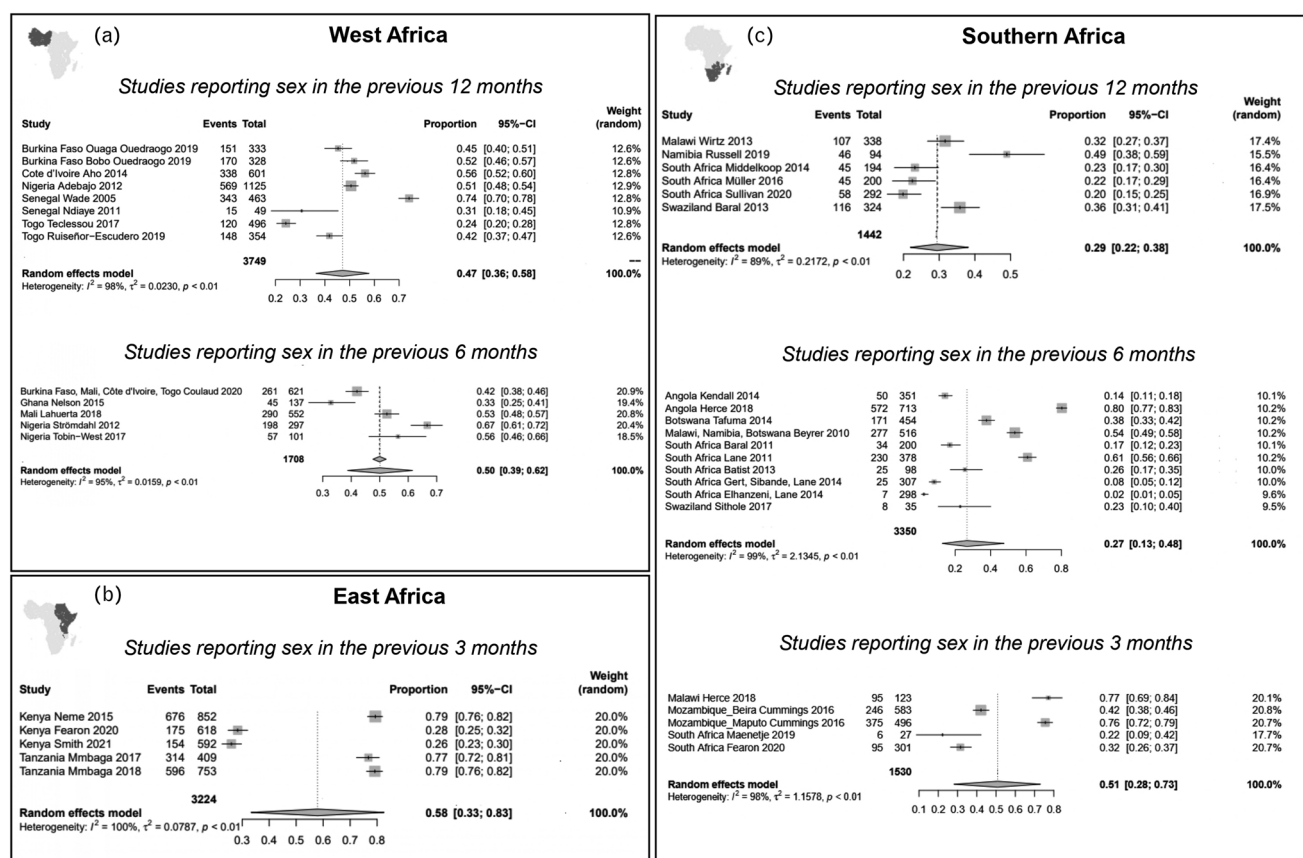


Fig. 2. Meta-analysis by region: percent of MSM who had recent sex with female partners.

articles (either interviewee verbatim, with participant's characteristics when available, or authors' citations).

Motives to have sex with female partners

The motives to have sex with women included sexual attraction, sexual openness, curiosity, love, and responding to sexual advances by women.

I am open, so let's say I go out, get very drunk and end up sleeping with a girl. The next morning I wake up and am sober. I start to think about this and see: 'Well, you know what? It's not that bad so why not give it a shot?' (interviewee verbatim, MSM, 18 y, South Africa) [112]

I have a boyfriend and two [female] fiancées. They were the ones who hit on me. I've never first courted a girl. They are the ones who run after me. There is love between us » (interviewee verbatim, MSM, 25 y, Senegal) [101]

Most often, sexual relations with women were because of bisexuality, that is to say the fact of also being sexually attracted to women, but also the desire to respect social conventions and to hide homosexuality from close friends and family members by having heterosexual sexual relations or lovers. More rarely, women soliciting sexual relations, whether paid for or not, was the reason for these sexual relations. (author's citation, Cote d'Ivoire) [119]

MSM working in salons also stated during in-depth interviews that they are often pressured by their female clients to engage in sex. (author's citation, Kenya) [55]

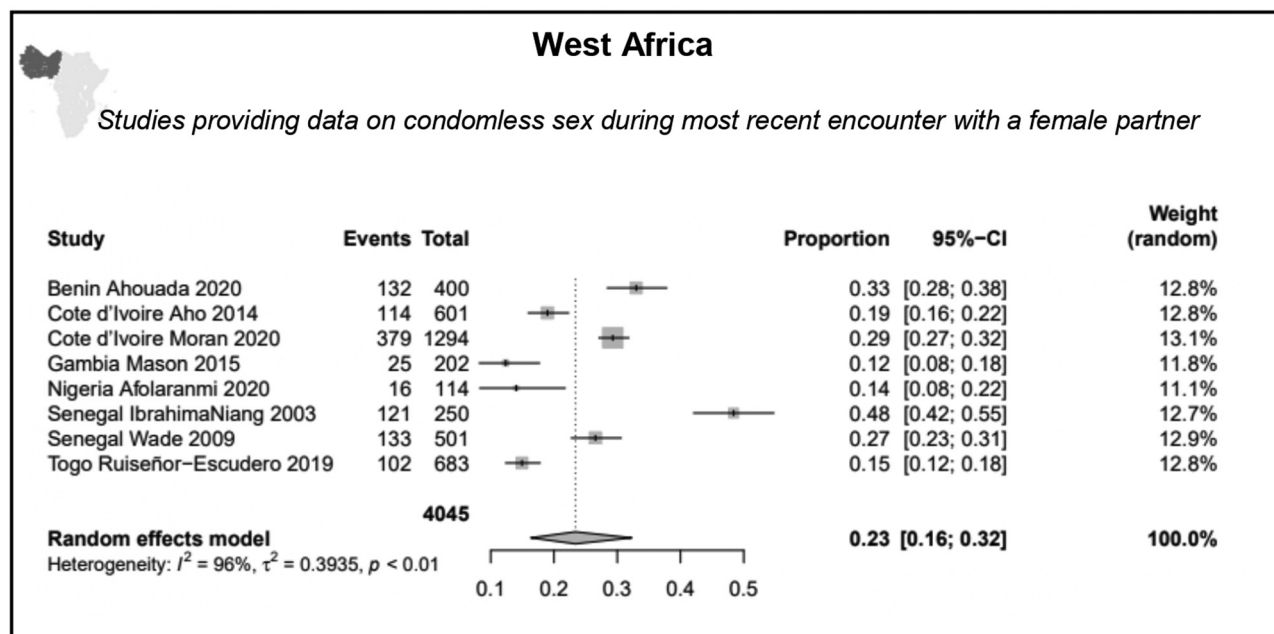
Most social, cultural and religious norms in SSA generally condemn same-sex behaviors and insist that men display masculinity. For MSM in SSA, having sex with women is a strategy to both comply with heteronormative social pressure and to hide same-sex behaviors from friends and family, as well as female partners.

I date girls once in a while, with a long gap in between. I chose double sexual citizenship, mainly because of what people like your family expect from you, they would expect to see you with a girl(s). Otherwise they would be wondering why it is that they never see you with a girl and start thinking all sorts of things. So you have got to have a girlfriend and do it with guys whenever you get the opportunity. If for example, a girl asked me for a relationship and I said no while I have no girlfriend, she would wonder why and think other things. So I have got to have a girlfriend for the sake of it, so that people wouldn't have ideas about me, so that I wouldn't be at odds with people (interviewee verbatim, MSM, 26y, Ethiopia) [104]

But what Islam forbids, which is not tolerated here in Senegal. And because God did not recommend, it is not a reality. It is bad. The union between the woman and the man, God recommends it. It is a reality. (interviewee verbatim, MSM, 21 y, Senegal) [101]

Table 2. Summary of studies reporting percent of MSM having had recent condomless^a sex with female partners.

SSA region	Study country (author, publication year)	MSM sample size	Recent condomless sex with female partners in MSM			Included in meta analyses
			Timeframe ^b	Value	Unit	
West	Senegal (Moreau, 2007) [79]	258	Previous 12m	48	%	
	Senegal (Wade, 2005) [29]	463		18	%	
	Senegal (Ndiaye, 2011) [30]	49		12	%	
	Benin (Ahouada, 2020) [80]	400	Most recent encounter	33	%	Fig. 3
	Cote d'Ivoire (Aho, 2014) [27]	601		19	%	Fig. 3
	Cote d'Ivoire (Moran, 2020) [38]	1294		29	%	Fig. 3
	Gambia (Mason, 2013) [81]	202		12	%	Fig. 3
	Nigeria (Afolaranmi, 2020) [82]	114		14	%	Fig. 3
	Senegal (IbrahimaNiang, 2003) [83]	250		48	%	Fig. 3
	Senegal (Wade, 2010) [39]	501		27	%	Fig. 3
East	Togo (Ruisseñor-Escudero, 2019) [32]	683		15	%	Fig. 3
	Kenya (Shangani, 2017) [47]	89	Most recent encounter	18	%	
	Tanzania (Mmbaga, 2017) [53]	409		88	%	
Southern	Tanzania (Mmbaga, 2018) [54]	753		62	%	
	Angola (Herce, 2018) [66]	713	Previous 6m	58	%	
	South Africa (Baral, 2011) [69]	187		59	%	
	South Africa (Lane, 2011) [70]	363		37	%	
	Malawi (Herce, 2018) [66]	123	Previous 3m	62	%	
	Mozambique (Cummings, 2018) [74]	1079		8	%	
	South Africa (Maenetje, 2019) [75]	27		15	%	
	Lesotho (Baral, 2011) [76]	252	Most recent encounter	33	%	
	Mozambique (Sathane, 2016) [84]	1325	Most recent encounter	32	%	

^aCondomless sex: vaginal or vaginal/anal or not specified.^b12m, 6m, 3m: 12, 6, 3 months prior to study.

* Percentages are presented for whole samples of MSM

Fig. 3. Meta-analysis by region: percent of MSM who had recent condomless sex with a female partner.

Table 3. Summary of studies reporting percentage of risky sexual behaviours with female partners in MSM.

			Recent risky ^a sexual behaviors with female partners			
SSA region	Study country (first author, publication year)	MSM sample size	Variable	Time-frame ^b	Value ^c	Unit
Number of female partners						
West	Gambia (Mason, 2015) [85]	202		Previous 12m	0.6	mean
	Benin (Ahouada, 2020) [80]	400		Previous 6m	0.7	mean
Southern	Nigeria (Strömdahl, 2012) [36]	297		Previous 6m	1.9	mean
	Senegal (Larmarange, 2009) [86]	501		Previous 1m	0.5	mean
	Malawi (Wirtz, 2013) [59]	338		Previous 12m	0.9	mean
	Botswana (Tafuma, 2014) [67]	454		Previous 6m	2.4	mean
	Malawi, Namibia, Botswana (Beyrer, 2010) [68]	537		Previous 6m	0.6	mean
	South Africa (Baral, 2011) [69]	200		Previous 6m	0.5	mean
	South Africa (Batist, 2013) [71]	98		Previous 6m	2.0	median
Multiple female partners						
West	Burkina Faso (Ouedraogo, 2019) [26], BoboDioulasso	328	≥2 female p.	Previous 12m	24	RDS w. %
	Ouagadougou	333		Previous 12m	35	RDS w. %
	Nigeria (Robbins, 2020) ^d	1432		Previous 12m	32	%
	Senegal (Ndiaye, 2011) [30]	49		Previous 12m	14	%
	Nigeria (Sheehy, 2014) [88]	557		Previous 2m	33	%
	Mali (Lahuerta, 2018) [35]	552		Previous 6m	23	%
	Cote d'Ivoire (Ndour, 2012) [119]	601	≥3 female p.	Previous 12m	29	RDS w. %
	Gambia (Mason, 2015) [85]	202		Previous 12m	8	%
	Nigeria (Adebajo, 2017) [89]	1125		Previous 12m	21	%
	Cote d'Ivoire (Moran, 2020) [38]	1301		Previous 1m	28	RDS w. %
	Senegal (Wade, 2005) [29]	463	≥4 female p.	Previous 12m	18	%
	Nigeria (Strömdahl, 2012) [36]	297	≥5 female p.	Previous 6m	3	%
	East	Kenya (Muraguri, 2015) [90]	563	≥3 female p.	Regular partner(s) in previous 12m and/or casual partner(s) in previous 6m	26
Tanzania (Mmbaga, 2017) [53]		409		Previous 3m	38	%
Southern	Tanzania (Mmbaga, 2018) [54]	753		Previous 3m	28	%
	Lesotho (Baral, 2011) [76]	252	≥3 female p.	Previous 12m	20	%
	Swaziland (Baral, 2013) [64]	324		Previous 12m	12	RDS w. %
	Mozambique (Sathane, 2016) [84] Beira	496		Previous 3m	22	%
	Nampula/Nacala	353		Previous 3m	17	%
	Naputo	583		Previous 3m	9	%
	South Africa (Maenetje, 2019) [75]	27		Previous 3m	11	%
Anal sex with female partners						
West	Senegal (Ndiaye, 2011) [30]	49		Previous 12m	8	%
	Nigeria (Sheehy, 2014) [88]	557		Previous 2m	22	%
Southern	South Africa (Lane, 2011) [70]	363		Previous 6m	16	RDS w. %
Condomless anal sex with female partners						
West	Senegal (Moreau, 2007) [79]	258		Previous 12m	52	%
	Senegal (Ndiaye, 2011) [30]	49		Previous 12m	2	%
	Nigeria (Sheehy, 2014) [88]	557		Previous 2m	19	%
East	Kenya (Smith, 2021) [52]	592		Previous 3m	3	%
Southern	South Africa (Lane, 2011) [70]	363		Previous 6m	9	RDS w. %
	Mozambique (Sathane, 2016) [84] – Beira	583		Previous 3m	3	%
	Maputo	496		Previous 3m	11	RDS w. %
Transactional sex with female partners						
West	Cote d'Ivoire (Hakim, 2015) [91]	601	Bought	Most recent sex previous 12m	0.3	%
	Senegal (Niang, 2003) [83]	250		During most recent encounter in	21	%
	Senegal (Larmarange, 2009) [36]	501		Previous 1m	4	%
	Cote d'Ivoire (Hakim, 2015) [91]	601	Sold	Most recent sex previous 12m	0.8	%
	Senegal (Niang, 2003) [83]	250		During most recent encounter in	13	%
	Senegal (Larmarange, 2009) [36]	501		Previous 1m	0.8	%
East	Tanzania (Dahoma, 2011) [92]	509	Bought	Previous 1m	36	%
Nondisclosure of HIV-positive status to female partners						
West	Nigeria (Tiamiyu, 2020) [93]	493			38	%

^aOther than condomless sex.^b12m, 6m, 3m, 1m: 12, 6, 3, 1 month(s).^cIn whole samples of MSM.^dData from Robbins SJ, Dauda W, Kokogho A, Ndembu N, Mitchell A, Adebajo S, *et al.* Oral sex practices among men who have sex with men and transgender women at risk for and living with HIV in Nigeria. *Plos One* 2020; 15:e0238745.

What really scared me was the thought of what if I couldn't satisfy her in bed? Would I even know how to do it with a girl? And I was really worried about this, very very worried. (. . .) And by then I had really convinced myself I could do it. So when we met, I was quite ready and performed rather well. I just grabbed her and we had a wonderful sex. (interviewee verbatim, MSM, Ethiopia) [104]

Poverty and financial needs also push MSM (self-identified heterosexuals and homosexuals) to engage in bisexual behaviors. Some of the former only have sex with other men for financial reasons. Some of the latter only have sex with women of higher social status for the same reason.

I am a real man and not goorjigeen [homosexual]., I have never been sexually abused. And I have never been penetrated from behind. I have sexual practices with men for the purpose of financing my studies (...). I have no one who can pay my tuition fees. (interviewee verbatim, MSM, 25 y, Senegal) [100]

Self-identified bisexuality was often associated with occasional emotional relationships with women, but could also reflect relationships of convenience. These included marital relationships used to cover up the secret lifestyle of a MSM, as well as situations in which women provide economic support to the man in exchange for a sexual relationship (author's citation, Kenya) [55]

Sexual behaviors and experience with female partners
Some MSM reported willingness but difficulties to perform sex with their female partners. Using a condom or not with female partners may depend on the type of relationship MSM have with male partners. Some MSM self-defined as faithful (not having other female partners). Certain MSM sought liberated sex or group sex experiences with female sex workers or self-identified lesbian women.

He said that he no longer took precautions with his partner during sex: 'We'll soon be together two years. He has a girlfriend to live the lie. He promised me that with her, he would systematically use a condom.' (author's citation and interviewee verbatim, MSM, 21 y, Cameroon) [102]

Among those who reported sexual activity with both male and female partners, the decision to use a condom or other preventive behaviors is similar but somewhat different depending on the type of partner involved. For instance, those who reported marriage to women almost never use condoms when they have intercourse with their wives because they want to avoid suspicion of any extra marital activity. (author's citation, Rwanda) [120]

After every sexual encounter with a man I am disgusted with my sexual partner. I deeply regret it. I get out of bed and take a shower and get dressed and I have no affection for him. But with girls it's different; there's more affection, because after sex I take her in my arms. I caress her. (interviewee verbatim, MSM, 20 y, Senegal) [100]

Moreover, our relationship [with a female sex worker] may be sexual in an episodic way; we might meet at private parties. Some say because they only have sexual pleasure with MSM. (...). In this relationship, there is a better chance of acceptance because female sex workers are more understanding on this point. They often seek different sexual experiences. So the relationship is free of sexual constraints." (interviewee verbatim, MSM, 26 y, Senegal) [100]

In fact, sexual relationships were commonly reported between effeminate males and 'butch' (as they were sometimes called) lesbians. (author's citations, Namibia) [110]

Discussion

Sexual behaviors with women in sub-Saharan African MSM

Our meta-analyses estimated that approximately half of MSM in East and West Africa reported recent sex with female partners; this is comparable with findings in some countries in the Middle East and in North Africa [121]. In Southern Africa, the proportion was less than one third in the previous 6 or 12 months, which is comparable with a meta-analysis in the USA (34% in the previous 12 months) [122] and in China (26% in the previous 6 months) [123], but higher than in a multicountry study in Europe (12% in the previous 6 months) [124].

Our qualitative synthesis highlighted three general motives for MSM having sex with women: erotic or romantic attraction, financial needs, and heteronormative pressure. With regard to the first reason, in some cases, MSM seek liberal sexual relationships with female sex workers. With respect to the second, some MSM expressed that their financial needs, leading them to engage in transactional sex, were the only reason behind their engagement in bisexual practices. This can manifest as having transactional sex with women while expressing sexual attraction only to men, or having transactional sex with men while expressing sexual attraction only to women. Heteronormative pressure is a major driver for MSM to have female partners, reflected in the need to comply to cultural norms, to show masculinity, and to keep one's MSM status secret. Previous research in Senegalese MSMW and their female partners revealed that the concept of a female partner and the nature of their relationships were contingent on MSMW's perceptions of homosexuality and their interactions with other men [125].

The high rates of sex with female partners in MSM as estimated by our meta-analysis, are probably partly driven by the strong stigma experienced by MSM [126], in a repressive context towards same-sex behaviors. The higher rates of sex with female partners in MSM in West and East Africa compared with Southern Africa,

could be partly because of different degrees of social and legal condemnation of same-sex relationships. Across SSA, it varies from recognition of rights to nonprotection towards discrimination, or even criminalization by imprisonment or death, depending on the country [127]. This probably influences the pressure experienced by MSM to have sex with women. Ongoing work from our systematic review showed that the proportion of self-identified bisexual MSM, a group with potential overlap with MSMW, was significantly lower in South Africa, compared with other Southern African countries [128]. Self-identifying as a bisexual man or having female partners may help to cope with social or internalized heteronormative pressure, which is probably less present in South Africa where same-sex marriage is legal (protective laws and policies may effectively reduce self-stigma in stigmatized populations) [128].

The quantitative synthesis also highlighted that condomless sex with female partners was common, which suggests that female partners are exposed to HIV, given the high HIV prevalence in MSM in most SSA countries [1]. The meta-analysis estimated the rate of condomless sex with female partners at one quarter of MSM in West Africa. Our qualitative synthesis highlighted that the willingness of hidden MSM (i.e. having female partners to keep homosexual behaviors secret) to avoid suspicion from their female partners is a major barrier to using a condom with them. Finally, the present synthesis reports a nonnegligible proportion of MSM having anal sex and condomless anal sex with female partners in SSA, two high-risk practices for HIV transmission in women [16].

Our synthesis provides qualitative insights into the underlying motives as to why MSM in this region have sex with women. The specific context of sexual relationships between MSM and women has implications for sexual risk and prevention behaviors. Because of stigma, MSM face both the pressure to have female partners and the need to keep their homosexual behaviors secret. Nondisclosure jeopardizes condom use in MSM with female partners and means that female partners may not be aware of their potential exposure to HIV. This prevention challenge adds to the adverse effect of stigma and discrimination (including in healthcare services) on MSM access to HIV and STI screening and treatments [8–12]. A previous meta-analysis estimated that in 2020, 69% (38–89%) of HIV-positive MSM in Africa were virally suppressed, which suggests that the other third of this population risk transmitting the disease to their sexual partners [129].

Implications for HIV epidemics and future research

Based on quantitative behavioral indicators and qualitative data, our multilevel synthesis supports the hypothesis that MSMW in SSA may act as a bridging population for HIV transmission in women. Furthermore, it is plausible

that the estimated proportions of MSMW in MSM are underestimated here, given that MSMW may be more concealed and thus more challenging to access than exclusive MSM [128]. On the other side, the data presented here are limited to the proportions of MSM engaging in sexual activity and at-risk behaviors with women, which does not necessarily imply that HIV bridging to women occurred. Indeed, while most of the included studies involved samples of both HIV-positive and HIV-negative MSM, the present synthesis lacks individual information about the HIV status and knowledge of MSM participants and their female partners to draw conclusions about HIV transmission from MSMW to women.

A previous systematic review reported that globally in SSA, bisexual MSM have lower HIV prevalence and less frequent receptive anal sex than exclusive gay MSM, which limits the risk of HIV transmission to female partners [130]. Modelling studies estimated the HIV incidence in female partners of MSM in Togo, Uganda, Kenya and Zambia, at 5.7, 5.9, 1.3 and 2.9 per 100 persons per year, respectively [131–134], which is two to eight times higher than in the general adult female population in these countries in 2000–2012 [1]. Other modelling work in West African countries suggested that the proportion of new HIV infections in women originating from MSMW is high in countries where HIV epidemics are concentrated in MSM but small in countries with mixed epidemics [135]. A systematic review of phylogenetic studies in SSA reported cases of HIV bridging between MSM and women in Southern and in West Africa, but evidence was limited in East Africa [136].

Regarding the mixed findings related to the presented behavioral indicators, modeling estimations, and the limited phylogenetic evidence available, we have limited certainty regarding HIV bridging between MSM and women in sub-Saharan Africa. In order to better evaluate, understand and prevent HIV bridging in different SSA countries, future research should give specific attention to transmission risk to women and collect further socio-behavioral and phylogenetic evidence concerning the female partners of MSM. Moreover, future research should aim to identify and better target not only MSMW but more specifically those who are most likely to engage in at-risk behaviors for both HIV acquisition from male partners and transmission to female partners [137]. In reflection with community-based organizations, sampling strategies and recruitment settings should be diversified, with a focus on approaches tailored to reach hidden MSM populations, such as RDS sampling and online recruitment, to enhance the representativeness of MSMW.

Perspectives for HIV prevention

Diversifying HIV/STI prevention, testing and treatment tools for MSM and strengthening community-based

organizations are essential to provide tailored support to MSMW, and to indirectly prevent HIV transmission to their female partners, as most of MSM's female partners may be unaware of their partners' MSM status and their exposure to risk. Among SSA MSM, misconceptions are common that HIV/STI only comes from heterosexual sex, or that the risk of infection is lower with male partners than with female partners [38,55,59,104]. Thus, efforts should be made to improve HIV knowledge among MSM, about their risk to acquire HIV from male partners and to transmit it to their female partners and indirectly to their children, about the available prevention tools, including treatment as prevention (TasP). Prevention counselling should take into account the specific needs related to sexual relationships with women, such as the need for discretion and the desire for fatherhood. Preexposure prophylaxis (PrEP) has been shown to be effective at reducing HIV incidence in MSM in SSA [138]. This alternative prevention tool can be valuable to reduce HIV transmission risk to female partners, given the strong barriers for condom use with them. However, the current low levels of PrEP awareness, acceptability, retention and adherence in this setting warrant increased efforts to improve PrEP information, delivery and access, especially for the most vulnerable and hidden MSM [139–143]. In addition, having female partners may pose specific barriers to oral PrEP uptake for MSM (in terms of secrecy); long-acting injectable PrEP may help to overcome this potential problem in the future [144].

More generally, sustained efforts to reduce discrimination and stigmatization of MSM may decrease the social pressure to have female sexual partners and, therefore, the HIV transmission risk from MSM to women.

Strengths and limitations

Due to the type and availability of data, several study limitations must be noted. First, in studies selected for the systematic review, the time periods used to assess recent sex and associated behaviors with women were very heterogeneous (previous month, 6 months, etc.), which limited the possibility to pool a larger number of studies in the meta-analyses. Second, the systematic review showed that the number of studies available in each SSA country is heterogeneous, some countries without available data, and some being overrepresented. Finally, our pooled proportions are not representative estimates of the entire MSM population in the regions of SSA. We hypothesize that study characteristics [e.g. time, country, setting (urban, townships, rural), MSM inclusion criteria, recruitment location and sampling methods, etc.] played a role in the heterogeneities observed within regions and countries in our meta-analysis, although we did not assess the effects of these factors because of limited data. To our knowledge, this is the first mixed-method systematic review investigating sexual behaviors of MSM with female partners in SSA. We reported, as exhaustively as possible, the pooled proportion of recent sex and sexual

behaviors with women (over a time period of 12 months or less) in studies conducted among MSM in SSA, separately for each region of SSA. The insights into the psychosocial and behavioral context of sex between MSM and women in this setting provided by our qualitative synthesis helps our understanding of the quantitative synthesis results.

We intend to investigate male bisexuality in SSA more generally using the large amount of quantitative and qualitative data, which were collected during the systematic review but which were beyond the scope of the present synthesis.

In conclusion, the present synthesis brings to light several dimensions of the risk of HIV bridging from MSM to women, reflected by both quantitative and qualitative analyses, with regional summaries. First, it lies in the widespread sex with female partners among MSM and the relatively high proportion of MSM with multiple female partners identified in our review. This highlights the increased risk of transmission in terms of the number of women exposed. Furthermore, frequent condomless sex and the occurrence of anal sex with female partners, increases the individual risk of female partners to acquire HIV. Finally, there is a potential overlap between MSM and female HIV key-populations (female sex workers and female clients of male sex workers). Male bisexual behaviors seem to be largely driven by socioeconomic and psychosocial constraints. Moreover, they vary across SSA regions; sex with female partners was estimated to be more common in MSM in East and West Africa than in Southern Africa. As the dynamics of HIV and the socio-political context differ across regions of SSA, the contribution of MSM to the HIV epidemics in women needs to be further explored locally, taking into account individual and socio-structural factors underlying bisexual behaviors. MSM community organizations need support to provide targeted HIV/STI prevention to MSM and their female partners; improve access to HIV testing, PrEP, and ARV in MSM; and advocate for better social acceptance of homosexuality.

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screening and assessment, data extraction, data management, qualitative thematic analysis, results synthesis, and drafted the manuscript. N.Y. performed article screening and assessment, and data extraction. R.G.D.M. performed the meta-analyses. All authors contributed to the revision of the manuscript and approved the final version.

Conflicts of interest

There are no conflicts of interest.

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