Open Forum Infectious Diseases

MAJOR ARTICLE

Hepatitis B Virus Prevalence and Vaccination in Men Who Have Sex With Men in West Africa (CohMSM ANRS 12324—Expertise France)

Ter Tiero Elias Dah,[1,2,3] Clotilde Couderc,[3] Alou Coulibaly,[4] Malan Jean-Baptiste kouamé,[5] Mawuényégan Kouamivi Agboyibor,[6] Issa Traoré,[1] Gwenaëlle Maradan,[7] Daniela Rojas Castro,[8] Ephrem Mensah,[6] Camille Anoma,[5] Bintou Dembélé Keita,[4] Bruno Spire,[7] and Christian Laurent[3]; on behalf of the CohMSM Study Group

[1]Association African Solidarité, Ouagadougou, Burkina Faso; [2]Institut National de Santé Publique, Centre Muraz, Bobo Dioulasso, Burkina Faso; [3]IRD, Inserm, Univ Montpellier, TransVIHMI, Montpellier, France; [4]ARCAD-SIDA, Bamako, Mali; [5]Espace Confiance, Abidjan, Côte d'Ivoire; [6]Espoir Vie Togo, Lomé, Togo; [7]Inserm, IRD, Univ Aix-Marseille, SESSTIM, Marseille, France; [8]Coalition Plus, Pantin, France

Background. Although men who have sex with men (MSM) are at high risk of hepatitis B virus (HBV) infection, they do not have access to vaccination in West Africa, which is a highly endemic region. We investigated HBV prevalence and associated factors, as well as acceptability and difficulties of vaccination in MSM enrolled in an operational research program in Burkina Faso, Côte d'Ivoire, Mali, and Togo.

Methods. We followed up 779 MSM in 2015–2018. Participants who were negative for both hepatitis B surface antigen (HBsAg) and antibodies (anti-HBs) at enrollment were offered HBV vaccination. Factors associated with HBV infection were identified using logistic regression models.

Results. Overall, HBV prevalence was 11.2% (95% confidence interval [CI], 9.0%–13.6%). It was lower in Togo than in Côte d'Ivoire (2.7% vs 17.3%; adjusted odds ratio [aOR], 0.12; 95% CI, 0.02–0.28) and higher in participants with 6+ recent male sexual partners (21.0% vs 9.3%; aOR, 1.48; 95% CI, 1.12–1.97). Of 528 participants eligible for vaccination, 484 (91.7%) were willing to be vaccinated and received at least 1 dose (ranging from 68.2% in Abidjan to 96.4% in Bamako; $P < .001$). Of the latter, 390 (80.6%) received 3 or 4 doses. The proportion of participants for whom the minimum required time between each dose was respected ranged from 10.9% in Bamako to 88.6% in Lomé ($P < .001$).

Conclusions. MSM in West Africa should be targeted more for HBV screening and vaccination. Although vaccination is well accepted by MSM, greater training of health care workers and education of MSM are required.

Keywords. Africa; hepatitis B; men who have sex with men; prevalence; vaccination.

Hepatitis B virus (HBV) infection is a major cause of severe morbidity (including liver cirrhosis and hepatocellular carcinoma) and mortality (887 000 deaths worldwide in 2015) [1, 2]. Approximately 2 billion people have evidence of past or present HBV infection, representing almost 30% of the world's population [3]. Among them, 257 million are living with HBV infection, defined as testing positive for hepatitis B surface antigen (HBsAg) [1]. The prevalence of HBV infection is highest in the Western Pacific and in Africa (6.2% and 6.1%, respectively).

In Africa, HBV prevalence has mainly been reported in the general population and blood donors. Data for specific groups are still needed to obtain a thorough understanding of the local epidemiology of HBV infection and to develop a suitable strategic plan [4]. Men who have sex with men (MSM) are at high risk of acquisition and transmission of sexually transmitted infections (STIs) including HBV infection. Preliminary reports suggest that HBV prevalence in MSM is not very different than that in the general population (eg, 13.9% vs 11.1% in Senegal, 8.0% vs 5.2% in Kenya, and 3.3% vs 7.2% in Tanzania), but this remains to be confirmed [5–8]. An HBV incidence of 6.0 per 100 person-years in MSM has also been reported in Kenya, highlighting the need for HBV prevention including vaccination in this population [6].

Vaccination against HBV infection is a key element of prevention and has been progressively scaled up in African countries thanks to its inclusion in the World Health Organization (WHO)–supported Expanded Program on Immunization in 1991 [9]. However, this program focuses on children under 5 years of age, and most adults today (ie, born before the era of HBV vaccination) have not been vaccinated [10]. Unlike most MSM in northern countries, African MSM do not have access to HBV vaccination in the routine care setting [11, 12].

Received 8 March 2019; editorial decision 21 May 2019; accepted 22 May 2019.

Correspondence: T. T. E. Dah, 09BP 940 Ouagadougou 09, Burkina Faso (tertiero81@gmail.com).

Open Forum Infectious Diseases®

DOI: 10.1093/ofid/ofz249

In this context, we investigated (1) HBV prevalence and associated factors and (2) acceptability and difficulties of vaccination in MSM enrolled in an operational research program in 4 countries in West Africa, which is a highly endemic region for hepatitis B.

METHODS

Study Setting and Design

The study was performed in MSM enrolled in the ongoing CohMSM prospective cohort study, which was designed to assess the feasibility and interest of implementing a quarterly global HIV prevention care intervention in this key population (registered with ClinicalTrials.gov, number NCT02626286). MSM were recruited and followed up between June 2015 and June 2018 in 4 community-based clinics already providing MSM-specific prevention, care, and support in Bamako (Mali), Abidjan (Côte d'Ivoire), Ouagadougou (Burkina Faso), and Lomé (Togo). Eligibility criteria were as follows: aged 18 years or older, reporting at least 1 episode of anal intercourse with another man in the previous 3 months, and being HIV negative or having discovered HIV infection at enrollment. At enrollment and during the intervention's quarterly follow-up visits, participants benefited from clinical examination, HIV testing, screening and treatment for other STIs (using the syndromic approach), and individualized peer-based support. They also received condoms and lubricants. MSM who tested HIV positive at enrollment were invited to initiate antiretroviral therapy (ART) immediately. MSM were also tested for hepatitis B, hepatitis C, and syphilis at enrollment. Screening for HBsAg was performed using the CTK Biotech assay (San Diego, CA) in Bamako, the Abon Biopharm assay (Hangzhou, China) in Abidjan, and the SD Bioline assay (Gyeonggi-Do, South Korea) in Ouagadougou and Lomé. When the HBsAg result was negative, antibodies to hepatitis B surface (anti-HBs) were tested for using the CTK Biotech assay in Bamako and Ouagadougou, the Abon Biopharm assay in Abidjan, and the Dia Source assay (Louvin La Neuve, Belgium) in Lomé. Participants who tested positive for HBsAg were referred to national specialized care services for further investigations and care. HIV/HBV-coinfected participants were offered tenofovir disoproxil fumarate (TDF) plus lamivudine (3TC) or emtricitabine (FTC) as part of ART. Vaccination against hepatitis B was part of the comprehensive intervention and was offered free of charge to participants who tested negative for both HBsAg and anti-HBs. Like the other interventions' components, HBV vaccination was promoted by both physicians and peer educators. Hepatitis B vaccine was administered as a 3-dose regimen (day 0, month 1, and month 6) or, from November 2016, as a 4-dose regimen (day 0, day 7, day 21, and month 12). Specific appointments were given outside the usual quarterly follow-up visits if needed. Vaccination status was assessed at every visit using participant and/or study site medical records. Finally, sociodemographic and behavioral data were collected at enrollment using a standardized face-to-face questionnaire administered by trained research assistants.

Statistical Analyses

HBV infection was defined as testing positive for HBsAg. The 95% confidence intervals (CIs) of the prevalence rates of HBV infection were computed using the binomial method. Factors associated with HBV infection were identified using logistic regression models. Potential determinants to be tested were selected a priori on the basis of existing literature about hepatitis B. All variables associated with HBV infection with $P < .20$ in univariate analyses were included in the complete multivariate model. A backward procedure was used to determine the final model. The goodness of fit of models was assessed using the Hosmer-Lemeshow test.

The proportions of vaccinated participants were compared between the study sites using the Fisher exact test. The vaccination schedule was assessed in participants who received 3 or 4 doses of vaccine. For the 3-dose regimen, the minimum required time was 21 days between the first and second doses and 4 months between the second and third doses. For the 4-dose regimen, the minimum required time was 6 days between the first and second doses, 12 days between the second and third doses, and 4 months between the third and fourth doses.

For all calculations, statistical significance was defined at $P < .05$. All statistical analyses were performed using Stata software (version 13; Stata Corp LP, College Station, TX).

Ethical Considerations

The study protocol was approved by the national ethics committees of Mali, Côte d'Ivoire, Burkina Faso, and Togo, and the institutional ethics committee of the French Institut de Recherche pour le Développement. All participants provided written informed consent.

RESULTS

Study Population

Of the 787 MSM enrolled in the CohMSM study, 779 (99.0%) were tested for HBsAg and were included in the present analysis (Figure 1). Participant characteristics are shown in Table 1. Three hundred four participants (39.0%) were enrolled in Bamako, 173 (22.2%) in Abidjan, 156 (20.0%) in Ouagadougou, and 146 (18.8%) in Lomé. Overall, the median age (interquartile range [IQR]) was 23.8 (21.4–27.4) years. Most participants had a secondary or higher educational level (82.2%) and were single (81.4%). Participants mainly self-defined as bisexual (64.1%) or homosexual/gay (30.8%). Approximately half perceived themselves as a man/boy, and 33.8% as both a man and a woman. The majority (53.5%) were sexually attracted to both men and

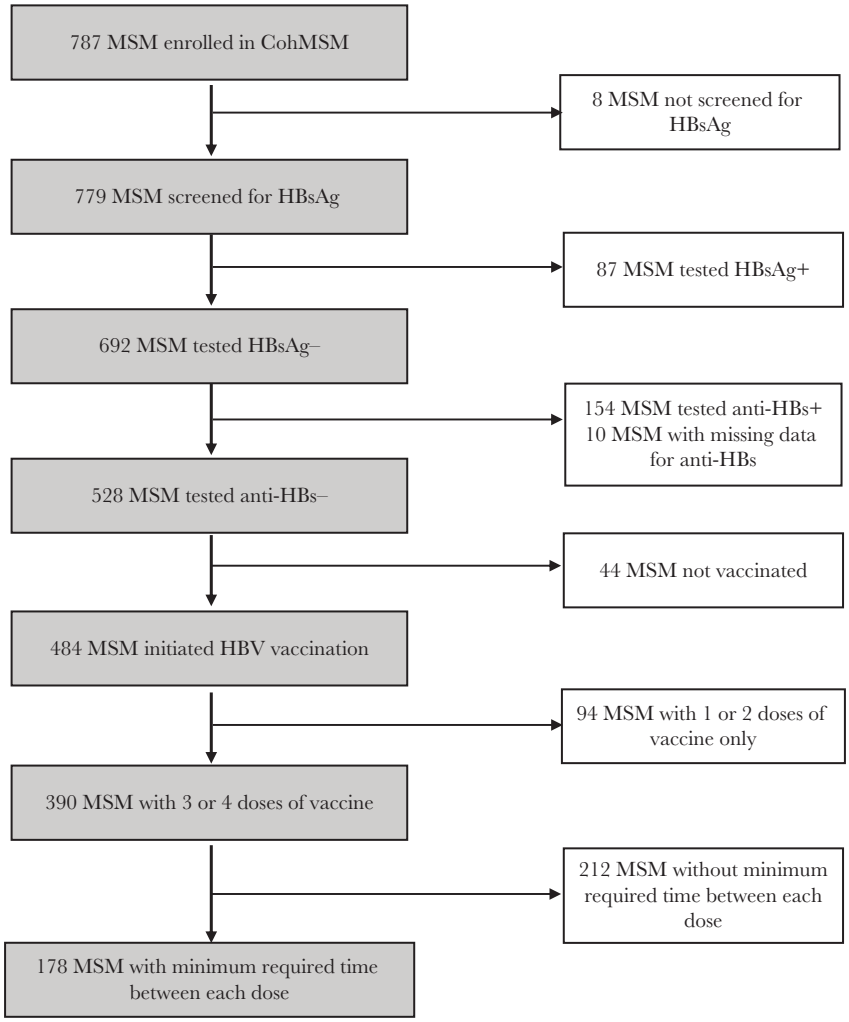

Figure 1. Flowchart of the HBV study (CohMSM study, West Africa, 2015–2018).

women. STI risky behaviors were common, as reflected by the high proportions of participants reporting unsystematic condom use during insertive anal sex (32.5%), unsystematic condom use during receptive anal sex (39.4%), or involvement in transactional sex with male partners (33.0%). As a potential result of these behaviors, 14.1% of participants had at least 1 symptomatic STI at enrollment, and 23.7% had a history of symptomatic STIs in the previous 12 months. One hundred fifty-nine participants tested HIV positive at enrollment (20.4%).

HBV Infection

Eighty-seven of the 779 participants tested were HBsAg positive, giving an overall prevalence of HBV infection of 11.2% (95% CI, 9.0%–13.6%). Specifically, prevalence was 17.3% (95% CI, 12.0%–23.8%) in Abidjan, 11.8% (95% CI, 8.4%–16.0%) in Bamako, 10.9% (95% CI, 6.5%–16.9%) in Ouagadougou, and 2.7% (95% CI, 0.7%–6.9%) in Lomé. HBV prevalence was significantly lower in Lomé than in Abidjan in both univariate and multivariate analyses (odds ratio [OR], 0.13; 95% CI, 0.05–0.39; $P < .001$; and adjusted OR [aOR], 0.12; 95% CI, 0.02–0.28; $P = .001$) (Table 2). By contrast, the difference between Abidjan and both Bamako and Ouagadougou did not reach statistical significance in either analysis.

HBV prevalence was 9.3% (95% CI, 7.0%–11.5%) and 21.0% (95% CI, 12.9%–29.1%) in participants reporting, respectively, a maximum of 5 and a minimum of 6 male sexual partners in the prior 6 months. HBV prevalence was significantly higher in the latter in both univariate and multivariate analyses (OR, 1.37; 95% CI, 1.14–1.65; $P = .001$; and aOR, 1.48; 95% CI, 1.12–1.97; $P = .007$).

In univariate analysis, HBV infection was also associated with gender identity and transactional sex with male partners. However, these relationships did not remain in multivariate analysis.

HBV prevalence was not significantly different between HIV-positive (14.5%; 95% CI, 9.4%–20.9%) and HIV-negative participants (10.3%; 95% CI, 8.0%–13.0%). However, the statistical power was only 33%.

Table 1. Baseline Characteristics of the 779 MSM Participants (CohMSM Study, West Africa, 2015–2018)

	All (N = 779)		Bamako (N = 304)		Abidjan (N = 173)		Ouagadougou (N = 156)		Lomé (N = 146)	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Age, y[a]	778	23.8 (21.4–27.4)	303	23.7 (21.2–26.9)	173	24.3 (22.1–27.7)	156	23.8 (21.2–28.1)	146	23.6 (20.0–26.9)
≤25		469 (60.3%)		193 (63.7%)		97 (56.1%)		93 (59.6%)		86 (58.9%)
Educational level	704		277		154		140		133	
Never attended school		14 (2.0%)		6 (2.1%)		2 (1.3%)		5 (3.6%)		1 (0.7%)
Elementary school		95 (13.5%)		64 (23.1%)		9 (5.8%)		13 (9.3%)		9 (6.8%)
Koranic school		16 (2.3%)		10 (3.6%)		6 (3.9%)		0 -		0 -
Secondary school		316 (44.9%)		106 (38.3%)		64 (41.6%)		75 (53.6%)		71 (53.4%)
University		263 (37.3%)		91 (32.8%)		73 (47.4%)		47 (33.6%)		52 (39.1%)
Marital status	698		271		155		139		133	
Single		568 (81.4%)		241 (88.9%)		78 (50.3%)		127 (91.3%)		122 (94.0%)
Married		35 (5.0%)		23 (8.5%)		2 (1.3%)		9 (6.5%)		1 (0.7%)
Free union		89 (12.7%)		4 (1.5%)		75 (48.4%)		3 (2.2%)		7 (5.3%)
Divorced/separated		4 (0.6%)		1 (0.4%)		0 -		0 -		3 (2.3%)
Widower		2 (0.3%)		2 (0.7%)		0 -		0 -		0 -
Self-definition of sexual orientation	750		302		168		136		144	
Homosexual/gay		231 (30.8%)		55 (18.2%)		54 (32.1%)		45 (33.1%)		77 (53.5%)
Heterosexual		11 (1.5%)		1 (0.3%)		2 (1.2%)		3 (2.2%)		5 (3.5%)
Transsexual/transgender		27 (3.6%)		15 (5.0%)		4 (2.4%)		4 (2.9%)		4 (2.8%)
Bisexual		481 (64.1%)		231 (76.5%)		108 (64.3%)		84 (61.8%)		58 (40.2%)
Gender identity	771		302		171		153		145	
A man/a boy		376 (48.8%)		152 (50.3%)		67 (39.2%)		61 (39.9%)		96 (66.2%)
Both a man and a woman		261 (33.8%)		103 (34.1%)		65 (38.0%)		62 (40.5%)		31 (21.4%)
Much more a woman		121 (15.7%)		45 (14.9%)		39 (22.8%)		19 (12.4%)		18 (12.4%)
Neither man nor woman		13 (1.7%)		2 (0.7%)		0 -		11 (7.2%)		0 -
Sexual attraction	772		302		171		154		145	
To men		315 (40.8%)		69 (22.8%)		99 (57.9%)		62 (40.3%)		85 (58.6%)
To men and women		413 (53.5%)		223 (73.8%)		63 (36.8%)		79 (51.3%)		48 (33.1%)
To women		44 (5.7%)		10 (3.3%)		9 (5.3%)		13 (8.4%)		12 (8.3%)
Condom use during insertive anal sex[b]	769		302		169		154		144	
Always		212 (27.6%)		78 (25.8%)		45 (26.6%)		53 (34.4%)		36 (25.0%)
Sometimes		250 (32.5%)		76 (25.2%)		57 (33.7%)		62 (40.3%)		55 (38.2%)
No insertive anal sex		307 (39.9%)		148 (49.0%)		67 (39.6%)		39 (25.3%)		53 (36.8%)
Sometimes		303 (39.4%)		113 (37.4%)		76 (45.0%)		55 (35.7%)		59 (41.0%)
No receptive anal sex		275 (35.8%)		109 (36.1%)		58 (34.4%)		57 (37.0%)		51 (35.4%)
Condom use during insertive anal sex[b]	769		302		169		154		144	
Always		191 (24.8%)		80 (26.5%)		35 (20.7%)		42 (27.3%)		34 (23.6%)
Received payment (whether financial or other) for transactional sex with male partners[b]	769		302		169		154		144	
Never		515 (67.0%)		191 (63.3%)		121 (71.6%)		112 (72.7%)		91 (63.2%)
Sometimes		226 (29.4%)		104 (34.4%)		35 (20.7%)		38 (24.7%)		49 (34.0%)
Always		28 (3.6%)		7 (2.3%)		13 (7.7%)		4 (2.6%)		4 (2.8%)

Table 1. Continued

	All (N = 779)		Bamako (N = 304)		Abidjan (N = 173)		Ouagadougou (N = 156)		Lomé (N = 146)	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Provided payment (whether financial or other) for transactional sex with male partners[b]	769		302		169		154		144	
Never		676 (87.9%)		262 (86.8%)		157 (92.9%)		136 (88.3%)		121 (84.0%)
Sometimes		88 (11.4%)		36 (11.9%)		12 (7.1%)		18 (11.7%)		22 (15.3%)
Always		5 (0.7%)		4 (1.3%)		0 -		0 -		1 (0.7%)
Group sex with male partners	769		302		169		154		144	
Never		565 (73.5%)		245 (81.1%)		102 (60.4%)		106 (68.8%)		112 (77.8%)
Once		94 (12.2%)		23 (7.6%)		28 (16.6%)		26 (16.9%)		17 (11.8%)
Several times		110 (14.3%)		34 (11.3%)		39 (23.1%)		22 (14.3%)		15 (10.4%)
Group sex with female partners	769		302		169		154		144	
Never		746 (97.0%)		296 (98.0%)		159 (94.1%)		150 (97.4%)		141 (97.9%)
Once		7 (0.9%)		2 (0.7%)		3 (1.8%)		1 (0.7%)		1 (0.7%)
Several times		16 (2.1%)		4 (1.3%)		7 (4.1%)		3 (1.9%)		2 (1.4%)
No. of male sexual partners[b]	735		301		169		121		144	
1		216 (29.4%)		105 (34.9%)		38 (22.5%)		32 (26.5%)		41 (28.5%)
2–5		419 (57.0%)		164 (54.5%)		90 (53.2%)		74 (61.2%)		91 (63.2%)
6–10		75 (10.2%)		23 (7.6%)		30 (17.8%)		13 (10.7%)		9 (6.2%)
>10		25 (3.4)		9 (3.0%)		11 (6.5%)		2 (1.6%)		3 (2.1%)
STI	778	110 (14.1%)	303	22 (7.3%)	173	27 (15.6%)	156	50 (32.1%)	146	11 (7.5%)
STI within the previous 12 mo	778	182 (23.7%)	303	41 (13.5%)	173	62 (35.8%)	156	45 (35.8%)	146	34 (23.3%)
Syphilis	778	9 (1.2%)	304	0 -	172	5 (2.9%)	156	3 (1.9%)	146	1 (0.7%)
HIV	779	159 (20.4%)	304	57 (18.7%)	173	40 (23.1%)	156	32 (20.5%)	146	30 (20.6%)
HBsAg	779	87 (11.2%)	304	36 (11.8%)	173	30 (17.3%)	156	17 (10.9%)	146	4 (2.7%)
Anti-HBs	682	154 (22.1%)	267	45 (16.8%)	143	80 (55.9%)	138	8 (5.8%)	134	21 (15.7%)
Anti-HCV	766	7 (0.9%)	303	2 (0.7%)	171	2 (1.2%)	156	2 (1.3%)	136	1 (0.7%)

Abbreviations: Anti-HCV, hepatitis C virus antibodies; HBsAg, hepatitis B surface antigen; Anti-HBs, hepatitis B surface antibodies; STI, sexually transmitted infection.

[a]Median age (interquartile range).

[b]Within the previous 6 months.

Table 2. Factors Associated With HBV Infection in the 779 MSM Participants Using Logistic Regressions (CohMSM Study, West Africa, 2015–2018)

	HBsAg+	Univariate Analysis			Multivariate Analysis		
	n (%)	OR	(95% CI)	*P*	aOR	(95% CI)	*P*
City							
Abidjan	30 (17.3%)	1			1		
Bamako	36 (11.8%)	0.64	(0.38–1.08)	.096	0.72	(0.36–1.08)	.246
Ouagadougou	17 (10.9%)	0.58	(0.31–1.10)	.098	0.65	(0.33–1.22)	.230
Lomé	4 (2.7%)	0.13	(0.05–0.39)	<.001	0.12	(0.02–0.28)	.001
Age, y							
≤25	51 (10.9%)	1					
>25	35 (11.3%)	1.05	(0.66–1.65)	.844			
Education level							
Less than secondary school	18 (14.4%)	1					
Secondary school	39 (12.3%)	0.84	(0.46–1.53)	.562			
University	22 (8.4%)	0.54	(0.28–1.05)	.071			
Marital status							
Married/free union	11 (8.9%)	1		.371			
Single/divorced/separated/widower	67 (11.7%)	1.16	(0.83–1.63)				
Self-definition of sexual orientation							
Bisexual/heterosexual	50 (10.2%)	1					
Homosexual/gay/transsexual/transgender	35 (13.6%)	1.39	(0.87–2.20)	.164			
Gender identity							
A man/a boy	30 (8.0%)	1		.010			
Much more a woman/both a man and a woman	53 (13.9%)	1.86	(1.16–2.98)				
Sexual attraction							
To men	43 (13.7%)	1					
To men and women/to women	42 (9.2%)	0.80	(0.64–1.00)	.053			
Condom use during insertive anal sex[a]							
Always	24 (8.5%)	1					
Sometimes	42 (9.6%)	1.14	(0.60–2.17)	.680			
No insertive anal sex	18 (13.7%)	1.41	(0.95–3.06)	.072			
Condom use during receptive anal sex[a]							
Always	19 (10.0%)	1					
Sometimes	40 (13.2%)	1.38	(0.77–2.45)	.279			
No receptive anal sex	25 (9.1%)	0.91	(0.48–1.69)	.756			
Received payment (whether financial or other) for transactional sex with male partners[a]							
Never	48 (9.3%)	1					
Sometimes/always	36 (14.2%)	1.27	(1.00–1.60)	.044			
Provided payment (whether financial or other) for transactional sex with male partners[a]							
Never	68 (10.1%)	1					
Sometimes/always	16 (17.2%)	1.36	(1.01–1.83)	.041			
Group sex with male partners							
Never	61 (10.8%)	1					
At least once	23 (11.3%)	1.02	(0.79–1.32)	.851			
Group sex with female partners							
Never	81 (10.9%)	1					
At least once	3 (13.0%)	1.23	(0.36–4.23)	.741			
No. of male sexual partners[a]							
1–5	59 (9.3%)	1			1		
≥6	21 (21.0%)	1.37	(1.14–1.65)	.001	1.48	(1.12–1.97)	.007
STI							
No	75 (11.2%)	1					
Yes	11 (10.0%)	0.88	(0.45–1.71)	.704			
STI within the previous 12 mo							
No	61 (10.2%)	1					
Yes	25 (13.7%)	1.40	(0.85–2.30)	.189			
Syphilis							
No	86 (11.2%)	1					
Yes	1 (11.1%)	0.99	(0.12–8.03)	.995			
HIV							
No	64 (10.3%)	1			1		
Yes	23 (14.5%)	1.47	(0.88–2.45)	.141	1.18	(0.67–2.07)	.574

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; STI, sexually transmitted infection.

[a]Within the previous 6 months.

HBV Vaccination

Of the 692 HBsAg-negative participants, 528 (76.3%) were also negative for anti-HBs and were eligible for HBV vaccination (Figure 1). Of the latter, the median follow-up time (IQR) was 21.1 (13.3–25.3) months. Four hundred eighty-four eligible participants (91.7%) were willing to be vaccinated and received at least 1 dose of vaccine, including 214 of 222 participants (96.4%) in Bamako, 122 of 130 participants (93.8%) in Ouagadougou, 105 of 113 participants (92.9%) in Lomé, and 43 of 63 participants (68.2%) in Abidjan. The proportion of participants who initiated HBV vaccination was significantly lower in Abidjan than in the other 3 study sites (68.2% vs 94.8%; $P < .001$). Of the 44 eligible participants who did not initiate vaccination, 19 (43.2%) did not come back for any planned follow-up visit (7 in Lomé, 6 in Bamako, 3 in Ouagadougou, and 3 in Abidjan), 4 (9.1%) were followed up for a maximum of 4 months (all in Abidjan), and 21 (47.7%) were followed up for more than 4 months (13 in Abidjan, 5 in Ouagadougou, 2 in Bamako, and 1 in Lomé).

Of the 484 participants who initiated vaccination, 390 (80.6%) received 3 or 4 doses, including 88 of 105 participants (83.8%) in Lomé, 174 of 214 participants (81.3%) in Bamako, 98 of 122 participants (80.3%) in Ouagadougou, and 30 of 43 participants (69.8%) in Abidjan. The proportion of participants with 3 or 4 doses of vaccine tended to be lower in Abidjan than in the other 3 study sites, but this difference did not reach statistical significance (69.8% vs 81.6%; $P = .060$).

In the 390 participants who received 3 or 4 doses of vaccine, the minimum required time between each dose was respected for only 178 participants (45.6%), including 78 of 88 participants (88.6%) in Lomé, 65 of 98 participants (66.3%) in Ouagadougou, 16 of 30 participants (53.3%) in Abidjan, and 19 of 174 participants (10.9%) in Bamako. The proportion of participants for whom the minimum required time between each dose of vaccine was respected was significantly lower in Bamako than in Abidjan, Ouagadougou, or Lomé ($P < .001$ for all 3 comparisons).

DISCUSSION

This multicountry study showed that, overall, the prevalence of HBV infection is high and that HBV vaccination is well accepted in MSM living in West Africa. However, it also highlighted that the vaccination schedule was not respected in a high proportion of participants. In addition, large discrepancies with regard to outcomes were observed between the study countries (Burkina Faso, Côte d'Ivoire, Mali, and Togo).

The prevalence of HBV infection differed between the study sites, being high in Abidjan (17.3%), Bamako (11.8%), and Ouagadougou (10.9%), but unexpectedly low in Lomé (2.7%). Our figure for Lomé was, however, in line with recent data in MSM in Togo (3.4%; 95% CI, 0.9%–5.9%) [13]. HBV prevalence rates in the first 3 study sites were among the highest reported to date in African MSM, whereas that for Lomé was among the lowest [5–7].

Compared with national estimations for the general population found in a systematic review of data published between 1965 and 2013 (9.4%; 95% CI, 8.7%–10.1% in Côte d'Ivoire; 13.1%; 95% CI, 12.7%–13.5% in Mali; 12.1%; 95% CI, 11.7%–12.4% in Burkina Faso; and 10.9%; 95% CI, 7.5%–15.6% in Togo) [8], the HBV prevalence rates in our study sites were higher (Abidjan), similar (Bamako and Ouagadougou), or lower (Lomé). However, it is worth noting that data in the systematic review for the general population in Togo came from only 1 study with 230 participants, whereas data for the other 3 countries reflected thousands and even tens of thousands of participants included in 7 or 8 studies. In Ouagadougou, our HBV prevalence was also comparable with recent data in a representative sample of men (10.5%; 95% CI, 9.6%–11.4%) [14].

A lower HBV prevalence in Togo than in other West African countries has also been reported in other populations. For instance, HBV prevalence was 5.2%, 10.1%, and 12.3% in HIV-infected patients in Togo, Côte d'Ivoire, and Senegal, respectively ($P = .02$) [15]. In prisoners, HBV prevalence was 10.9% in Togo and 14.1% in Senegal, but the difference was not statistically significant ($P = .21$) [16]. In our study, the large discrepancy between Lomé and the other 3 study sites is, however, unclear and merits further investigation.

The small HBV prevalence differences between our study population and the general population in Burkina Faso, Côte d'Ivoire, and Mali suggest that most HBV infections in MSM occurred during childhood. However, the association found in our study between HBV infection and the number of male sexual partners in the prior 6 months suggests that sexual transmission is responsible for an additional number of infections in this population. Fortunately, HBV acquisition in adulthood progresses to chronic infection in less than 5% of cases, as compared with 95% for HBV acquisition in childhood [3]. Nevertheless, as well as the consequences for MSM themselves, these acute infections can be transmitted to women because most African MSM also have heterosexual relationships [17, 18], something indirectly confirmed by the characteristics on sexual orientation, gender identity, and sexual attraction reported by our participants. In addition to education on prevention measures (ie, reduction of the number of sexual partners and use of condoms), HBV vaccination should therefore be proposed to MSM in Africa (as is already the case in northern countries), especially those most at risk of sexual exposure (eg, MSM with a high number of male sexual partners). Vaccination of MSM is important for eliminating viral hepatitis [19]. The high proportions of MSM willing to be vaccinated and who received at least 1 (91.7%) or 3 (80.6%) doses of vaccine suggest good acceptability in this vulnerable population.

In our study, HBV vaccination was hindered by organizational constraints, especially in Abidjan. More specifically, vaccination in Abidjan was administered to participants only at set times on set days by the team of the Institut National d'Hygiène Publique, initially in the study site clinic, and then in the clinic of the Institut National d'Hygiène Publique. By contrast, vaccination could be administered to participants at any moment by the study medical teams in Bamako, Lomé, and Ouagadougou. Temporary stock-outs of vaccines also hampered their administration, for instance, in Bamako and Ouagadougou. Our findings suggest that vaccination must be available at any moment in clinics focusing on MSM care. Furthermore, the vaccination schedule was impeded, especially in Bamako, because (1) some participants did not attend the specific appointment (ie, outside the usual quarterly follow-up visits), particularly at month 1 for the second dose of the 3-dose regimen (the most commonly used), and therefore received it at month 3, and (2) some physicians thought the third dose should be administered at month 6, independent of the actual timing of the second dose. Our results suggest that health care workers providing HBV vaccination need further training, especially with regard to scheduling doses. Education of MSM is also required.

The main strength of this study is that HBV prevalence and vaccination were investigated in MSM enrolled and followed up in 4 different West African contexts. This allowed us to highlight differences in these outcomes between the study countries. However, our findings should be interpreted taking into account the following limitations. First, the study was performed on a convenience sample of MSM attending MSM-friendly clinics. Accordingly, they might not be fully representative of the global MSM community in the 4 study countries. Second, HBV screening was only performed using rapid tests, and individual national programs used tests from different manufacturers. Third, we were not able to investigate the determinants of vaccination acceptability as few participants did not agree to be vaccinated.

CONCLUSIONS

At a time where many West African countries are starting either to conceive or implement their national program against viral hepatitis, this study underlines the need to pay special attention to MSM for HBV screening, care, and vaccination activities. HBV vaccination is well accepted by MSM in the region, but greater training of health care workers and education of MSM are required.

Acknowledgments

We thank all the participants involved in this study. We also thank Jude Sweeney (Milan, Italy) for the English revision and editing of the manuscript.

Financial support. This study was supported by the ANRS (France Recherche Nord & Sud Sida-hiv Hépatites; ANRS 12324) and Expertise France (Initiative 5%). T.T.E.D. is the recipient of a doctoral fellowship from ANRS (12324-B99).

Potential conflicts of interest. All authors: no reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

CohMSM Study Group. Clotilde Couderc, Bruno Granouillac, Suzanne Izard, Christian Laurent, Laura March, Martine Peeters, Laetitia Serrano (IRD, INSERM, Université de Montpellier, Unité TransVIHMI, Montpellier, France); Cyril Berenger, Michel Bourrelly, Pierre-Julien Coulaud, Gwenaelle Maradan, Marion Mora, Luis Sagaon-Teyssier, Bruno Spire (INSERM, IRD, Université Aix-Marseille, Unité SESSTIM, Marseille, France); Adeline Bernier, Paméla Palvadeau, Daniela Rojas Castro (Coalition Internationale Sida, Pantin, France); Drissa Camara, Oumar Cisse, Alou Coulibaly, Bintou Dembélé Keita, Fodié Diallo, Mahamadou Diarra, Abdoul Aziz Keita, Kader Maiga, Aly Ouologuem, Fodé Traore (ARCAD-SIDA, Bamako, Mali); Niamkey Thomas Aka, Camille Anoma, Stéphane-Alain Babo Yoro, Noufo Hamed Coulibaly, Rachelle Kotchi, Patrick Kouabenan, Malan Jean-Baptiste kouamé, Kpassou Julien Lokrou, Frédéric Dibi N'Guessan (Espace Confiance, Abidjan, Côte d'Ivoire); Christian Coulibaly, Ter Tiero Elias Dah, Ousseni Ilboudo, Joseph Ouedraogo, Mamadou Ouedraogo, Elisabeth Thio, Juste Rodrigue Toure, Abdoulazziz Traore, Issa Traoré (Association African Solidarité, Ouagadougou, Burkina Faso); Fiffou Yougbare (Centre National de Transfusion Sanguine, Ouagadougou, Burkina Faso); Kouakou Kokouvi Selom Agbomadji, Mawuényégan Kouamivi Agboyibor, Messan Attiogbe, Aléda Mawuli Badjassim, Agbégnigan Lorette Ekon, Anouwarsadat Kokouba, Ephrem Mensah, Diimiln Joseph Strauss Tablissi, Kossi Jeff Yaka (Espoir Vie Togo, Lomé, Togo); Claver Anoumou Yaotsé Dagnra (Laboratoire BIOLIM, Université de Lomé, Lomé, Togo).

References

1. World Health Organization. Global Hepatitis Report 2017. Geneva: World Health Organization; **2017**.
2. Stanaway JD, Flaxman AD, Naghavi M, et al. The global burden of viral hepatitis from 1990 to 2013: findings from the Global Burden of Disease Study 2013. Lancet **2016**; 388:1081–8.
3. Trépo C, Chan HLY, Lok A. Hepatitis B virus infection. Lancet **2014**; 384:2053–63.
4. World Health Organization. Global Health Sector Strategy on Viral Hepatitis, 2016–2021. Towards Ending Viral Hepatitis. Geneva: World Health Organization; **2016**.
5. Dramé FM, Crawford EE, Diouf D, et al. 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.
6. Wahome E, Ngetsa C, Mwambi J, et al. Hepatitis B virus incidence and risk factors among human immunodeficiency virus-1 negative men who have sex with men in Kenya. Open Forum Infect Dis **2017**; 4(X):XXX–XX.
7. Mmbaga EJ, Moen K, Leyna GH, et al. HIV prevalence and associated risk factors among men who have sex with men in Dar es Salaam, Tanzania. J Acquir Immune Defic Syndr **2018**; 77:243–9.
8. Schweitzer A, Horn J, Mikolajczyk RT, et al. Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2013. Lancet **2015**; 386:1546–55.
9. World Health Organization. Expanded programme on immunization. global advisory group-part 1. Report No. Wkly Epidemiol Rec **1992**; 67:11–5.
10. World Health Organization. Guideline for the Prevention Care and treatment of Persons with Chronic Hepatitis B Infection. Geneva: World Health Organization; **2015**.
11. Schillie S, Vellozzi C, Reingold A, et al. Prevention of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep **2018**; 67:1–31.
12. van Rijckevorsel G, Whelan J, Kretzschmar M, et al. Targeted vaccination programme successful in reducing acute hepatitis B in men having sex with men in Amsterdam, the Netherlands. J Hepatol **2013**; 59:1177–83.
13. Ferré VM, Gbeasor-Komlanvi FA, Collin G, et al. Prevalence of human papillomavirus, HIV and other sexually transmitted infections among men having sex with men in Togo: a national cross-sectional survey. Clin Infect Dis **2018**; doi: 10.1093/cid/ciy1012.

14. Meda N, Tuaillon E, Kania D, et al. Hepatitis B and C virus seroprevalence, Burkina Faso: a cross-sectional study. Bull World Health Organ **2018**; 96:750–9.
15. Jaquet A, Wandeler G, Nouaman M, et al. Alcohol use, viral hepatitis and liver fibrosis among HIV-positive persons in West Africa: a cross-sectional study. J Int AIDS Soc **2017**; 19:21424.
16. Jaquet A, Wandeler G, Tine J, et al. HIV infection, viral hepatitis and liver fibrosis among prison inmates in West Africa. BMC Infect Dis **2016**; 16:249. doi: 10.1186/s12879-016-1601-4.
17. Wade AS, Kane CT, Diallo PA, et al. HIV infection and sexually transmitted infections among men who have sex with men in Senegal. AIDS **2005**; 19:2133–40.
18. Henry E, Marcellin F, Yomb Y, et al. Factors associated with unprotected anal intercourse among men who have sex with men in Douala, Cameroon. Sex Transm Infect **2010**; 86:136–40.
19. Spearman CW, Afihene M, Ally R, et al. Hepatitis B in sub-Saharan Africa: strategies to achieve the 2030 elimination targets. Lancet Gastroenterol Hepatol **2017**; 2:900–9.