December 2025; 16(2): 92-103
Jurnal Kesehatan Reproduksi
DOI: 10.58185/jkr.v16i2.393
ISSN: 2354-8762 (Online)
https://journaliakmitangsel2.iakmi.or.id/index.php/kespro

ASSOCIATION BETWEEN WATER OR GEL BASED LUBRICANT USE WITH CONDOM LEAKAGE AMONG YOUNG MSM IN INDONESIA

Sherly Novita Mamoribo[1], Mona Safitri Fatiah[2*]

[1] Departemen of Health Promotion, Faculty of Public Health, Cenderawasih University, Papua, Indonesia
[2] Departemen of Reproductive Health, Faculty of Public Health, Cenderawasih University, Papua, Indonesia

Email: fatiahmonas@gmail.com
* Corresponding author

Article Info

Keywords:
Water-based lubricant;
Condom Leakage;
Young MSM;
HIV Prevention;
Indonesia

Abstract

Background: In Indonesia, water-based lubricant use among men who have sex with men (MSM) is lower than that reported in transgender populations (84.4%). This study examined the association between water or gel based lubricant use and condom failure, defined as leakage or breakage, among young MSM. **Methods:** Data were drawn from the 2018–2019 Integrated Biological and Behavioral Survey (IBBS), a cross-sectional survey in 24 provinces. Of 6,000 MSM, 2,213 respondents aged 15–25 years were recruited using Respondent Driven Sampling (RDS). Logistic regression in STATA 16 assessed associations, adjusting for circumcision status and number of male sexual partners.
Results: Condom failure in the past month was reported by 8.8% of respondents, and 66.3% used water-based lubricants. Non-use of water- or gel-based lubricants was associated with higher adjusted odds of condom failure, but not statistically significant (AOR 1.79; 95% CI 0.79–4.05). Condom failure was more common among those reporting more male clients. Circumcision status was also related, with lower odds of failure among uncircumcised participants.
Conclusions: Water-based lubricant use was not significantly linked to reduced condom failure. Improving condom-use skills, promoting compatible lubricants, and targeting MSM with multiple partners remain important for reducing condom failure and HIV/STI risks.

This is an open-access article under the CC–BY-SA license.

Received 16/10/2025 Revised 18/11/2025 Accepted 17/02/2026

How to Cite:

Mamoribo SN, Fatiah MS. ASSOCIATION BETWEEN WATER OR GEL BASED LUBRICANT USE WITH CONDOM LEAKAGE AMONG YOUNG MSM IN INDONESIA. J. Kesehat. Reproduksi [Internet]. 2025 Dec. 16(2):93-103. Available from: https://doi.org/10.58185/jkr.v16i2.393

INTRODUCTION

Men who have sex with men (MSM) remain a population that is excessively affected by *Sexually Transmitted Infections* (STIs), particularly *Human Immunodeficiency Virus* (HIV). Although MSM are estimated to represent only 3% of the global population, their epidemiological burden is higher than that of the general population.[1,2] In the Asia–Pacific region, for instance, the estimated prevalence of MSM is only 0.79%. Among them, Indonesia is reported to have one of the lowest regional estimates at around 0.58%.[1] Despite this relatively small population size, MSM in Indonesia continue to experience a high burden of HIV and other STIs. Globally, MSM are estimated to be 26 times more likely to acquire HIV compared with the general adult population, with an HIV prevalence of 7.7% versus 0.8% among adults overall.[3,4] A similar disparity is observed for syphilis, where pooled estimates from 2000 to 2020 indicate a prevalence of 7.5% among MSM, compared with only 0.5% among men in general.[5] These persistent differences indicate that vulnerability to STIs among MSM is shaped not only by biological susceptibility, but also by structural, social, and behavioral determinants that influence exposure and prevention practices.

In Indonesia, national surveillance data reflect similar inequities. As of early 2024, approximately 30.5% of MSM who underwent HIV screenings tested positive, while 8.3% were diagnosed with other STIs.[6] These figures suggest that Indonesia remains far from achieving the 2030 global targets, which aim for high levels of HIV status awareness and substantial reductions in STI incidence.[1,7] This gap highlights the importance of examining behavioural pathways that directly influence STI transmission, including condom use practices, lubricant selection, and contextual barriers that may be particularly salient among younger MSM. In particular, adolescents and young adults aged 15–25 years can be deemed as a subgroup that needs special attention. Individuals in this age range are often in the early stages of sexual exploration. They may have limited access to accurate sexual health information, insufficient condom use skills, and greater exposure to peer-driven risk behaviours.[8,9] These factors may contribute to inconsistent condom use and improper application, thereby increasing the likelihood of condom failure during sexual activity.

Correct and consistent condom use is still considered a key strategy to prevent HIV and STI. However, condom failure, commonly defined as breakage, slippage, or leakage, continues to weaken its protective effectiveness.[10] Frequently, this failure is caused by incorrect application, limited user experience, hurried or vigorous intercourse, intoxication, and the use of incompatible lubricants.[11] Water-based lubricants are known to reduce friction and support condom integrity. The function is different from oil-based products, such as petroleum jelly, which degrade latex and substantially increase the risk of condom damage when applied improperly.[12,13] Accordingly, the World Health Organization (WHO) recommends the use of water or silicone-based lubricants during anal and

DOI: 10.58185/jkr.v16i2.393
ISSN: 2354-8762 (Online)

vaginal intercourse. Despite these recommendations, the use of appropriate lubricants among young MSM in Indonesia remains inconsistent. Data from the 2018–2019 Integrated Biological Behavioral Survey (IBBS) indicate that 84.4% of MSM reported using lubricants, slightly lower than that observed among transgender populations.[6] However, the survey does not consistently differentiate lubricant types, raising concerns about potential exposure misclassification. This issue is particularly important because oil-based and water-based lubricants have opposing effects on latex condom integrity. Using nationally representative IBBS data, this study examines whether the use of water or gel-based lubricant has an effect on condom failure among MSM aged 15–25 years in Indonesia. By focusing on condom-compatible lubricant exposure, this analysis aims to minimise misclassification and provide evidence to inform sexual health education, lubricant distribution strategies, and HIV/STI prevention efforts for young MSM in Indonesia and other contexts.

METHODS

Study Design and Data Source

This study employed a cross-sectional design using secondary data derived from the 2018–2019 IBBS. The data were obtained through formal data requests to the Directorate General of Disease Prevention and Control, Ministry of Health, Indonesia. The IBBS was conducted in 24 provinces and targeted key populations, including MSM. The present analysis was conducted between February and March 2025.

Study Population and Sample

The source population comprised 6,000 MSM respondents across 24 provinces. Among them, 2,213 were selected as the sample in this study. The sample consisted of MSM aged 15–25 years who reported engaging in anal sex with male partners (once, occasionally, or frequently) within the past year, had resided in the survey location for at least one month, and met other IBBS eligibility criteria. Respondents who reported only vaginal sex with women and did not report anal sex with men were excluded to ensure conceptual consistency between the exposure (lubricant use during anal sex) and the outcome (condom failure during anal intercourse). Additionally, MSM residing in conflict or inaccessible areas were excluded due to data limitations.

Sampling and Data Collection

Respondent Driven Sampling (RDS) was used to recruit hard-to-reach populations, including MSM and people who inject drugs (PWID). The sampling technique involved several processes. Initially, participants ("seeds") who met eligibility criteria recruited peers from their social networks. Then, recruitment continued in successive waves until the target sample size was achieved. Data

were collected using standardized, population-specific IBBS questionnaires administered by trained interviewer.

Variables and Measurements

Outcome Variable

The primary outcome in this study was condom failure. The data were mainly obtained from self-reported condom failure during the most recent anal sex with a male partner, defined as any incident of condom breakage, leakage, or slippage (coded as 1 = Yes, 0 = No).

Exposure Variable

The primary independent variable was the use of water-based lubricant during the most recent anal sex encounter (1 = Yes, 0 = No). This variable represents a modifiable behavioural factor, as lubricant choice can be influenced through education, access, and prevention programs. To minimise exposure misclassification, respondents who reported using oil-based lubricants or lubricants of unknown type were excluded from the exposure analysis, given the well-established adverse effects of oil-based products on latex condom integrity. Condom failure (leakage or tearing) was assessed based on the most recent sexual intercourse, which may have involved anal or vaginal sex; therefore, associations involving lubricant use were interpreted cautiously due to potential event non-concordance.

Covariates

Covariates are both behavioural and clinical factors that are potentially modifiable through public health interventions. In this study, clinical factors included circumcision status (1 = circumcised, 0 = uncircumcised), measured as a self-reported biological characteristic. Meanwhile, behavioural factors included perceived risk of HIV infection (0 = not at risk, 1 = do not know, 2 = at risk), source of condoms (0 = both free and purchased, 1 = free only, 2 = purchased only), condom brand (Sutra, Fiesta, Durex, BKKBN, Artika, Pleasure Plus, and others), number of sexual partners in the past week (0 = ≥4 partners, 1 = ≤3 partners), buying sex from men in the past month (0 = yes, 1 = no), selling sex to men in the past month (0 = yes, 1 = no), number of male clients served in the past month (0 = ≥4, 1 = ≤3), alcohol use (0 = yes, 1 = no), and drug use in the past three months (0 = yes, 1 = no). These variables were included to control for potential confounding and to support the interpretation of behavioural and clinical contexts related to condom failure.

Statistical Analysis

Data were analyzed using Stata 16.RDS-II weights provided by the IBBS to account for network size and non-random recruitment inherent in RDS. Univariate analyses described weighted

sample characteristics. Meanwhile, bivariate associations between water-based lubricant use and condom failure were assessed using weighted chi-square tests. Multivariable logistic regression was conducted with water-based lubricant use defined a priori as the primary exposure of interest. Candidate variables for multivariable analysis were identified using bivariate weighted chi-square tests. Variables with p-values < 0.25 were included. Variables with established epidemiological relevance based on prior literature were also included, irrespective of bivariate significance. All selected variables were entered into an initial multivariable model to estimate Adjusted Odds Ratios (aORs) and 95% Confidence Intervals (CIs) for the association between water-based lubricant use and condom failure. A change-in-estimate approach was then applied to assess confounding, whereby variables whose removal resulted in a change greater than 10% in the aOR of the primary exposure were retained. This process continued until a final, parsimonious model was obtained.

Ethical Considerations

This study received ethical approval from the Ethics Committee of the Faculty of Public Health, Cenderawasih University (No. 057/KEPK-FKM UC/2025). The Ministry of Health authorized data use following official verification and approval procedures.

RESULTS

As presented in Table 1, 8.8% of young men who have sex with men (MSM) reported experiencing condom leakage or tearing once in the past month, while 3.4% reported experiencing such incidents more than once. In terms of lubricant types, most of the participants (66.3%) indicated that they had used water- or gel-based lubricants during sexual intercourse within the same period.

Table 1. History of Condom Leakage and Lubricant addition among Young Men sex with Men in Indonesia

Variable	n	%
Incidence of Condom failure (last month)		
Ever, once	138	8,8
Ever more than once	53	3,4
Never torn / leaked	1,568	87,8
Use of water/gel based lubricants		
Yes	1,428	66,3
No	725	33,7

To identify the drivers of these incidents, bivariate analysis was performed to examine the associations between various behavioral and clinical factors and the likelihood of condom failure. As shown in Table 2, the use of water- or gel-based lubricants was associated with differences in the proportion of condom leakage or tearing across categories, with a statistically significant association observed in the bivariate analysis (p = 0.001). Circumcision status also showed a statistically significant association with condom failure (p = 0.017). In contrast, perceived risk of HIV infection,

whether categorized as "do not know" (p = 0.893) or "at risk" (p = 0.172), was not statistically associated with condom failure. Similarly, the source of condom acquisition, including obtaining condoms for free (p = 0.130) or purchasing condoms (p = 0.100), showed no statistically significant association. Most condom brands were not associated with condom failure, except the Pleasure Plus brand that showed a statistically significant association in the bivariate analysis (p = 0.038). Regarding sexual behaviour, the number of sexual partners (male and female) in the past week was significantly associated with condom failure, with a higher proportion observed among participants reporting four or more partners (p = 0.001). Purchasing sex from men in the past month was not significantly associated with condom failure (p > 0.05), whereas selling sex to men (p = 0.001) and serving four or more male clients during the same period (p = 0.049) were significantly associated with higher proportions of condom failure. Alcohol consumption (p = 0.700) and drug use in the past three months (p = 0.461) were not statistically associated with condom leakage or tearing.

Table 2. Results of Bivariate Analysis

Variables	Condom Failure				Total		p
	Yes		No				
	n	%	n	%	n	%	
Addition of water/gel-based lubricants							
Yes	165	14.6	981	85,4	1,148	100	0.001
No	24	5.7	396	94,3	420	100	
Circumcision							
No	20	7.8	238	92.2	258	100	0.017
Yes	171	13.1	1,139	86.9	1,310	100	
Risk of contracting HIV							
Not risk	132	12.8	903	87.2	1,035	100	Reff
Don't know	24	13.1	159	86.9	183	100	0.893
Risk	35	10.0	315	90.0	350	100	0.172
Obtaining							
Purchase and free	42	15.3	232	84.7	274	100	Reff
Free	65	11.6	496	88.4	561	100	0.130
Purchase	84	11.5	649	88.5	733	100	0.100
Condom brand							
Sutra	143	12.0	1,047	88.0	1,190	100	Reff
Fiesta	19	9.9	173	90.1	192	100	0.397
Durex	20	13.5	128	86.5	148	100	0.600
BKKBN/KB	2	40.0	3	60.0	5	100	0.084
Artika	0	0	2	100.0	2	100	0
Pleasure plus	6	27.3	16	72.7	22	100	0.038
Others	1	11.1	8	88.9	9	100	0.934
Number of sex partners (male and female) in the past week							
≥ 4 people	26	25.7	75	74.3	101	100	0.001
≤ 3 people	149	12.7	1,023	87.3	1,172	100	
Purchased sex with men in the past month							
Yes	21	28.8	52	71.2	73	100	0.090
No	12	16.9	59	83.1	71	100	
Reported having exchanged sec for money with men in the past month							
Yes	90	20.6	347	79.4	437	100	0.001
No	101	8.9	101	91.1	1,131	100	

Variables	Condom Failure				Total		p
	Yes		No				
	n	%	n	%	n	%	
Number of male clients engaged with in the last month							
≥ 4 people	36	36.0	64	64.0	100	100	0.049
≤ 3 people	30	24.0	95	76.0	125	100	
Alcohol consumption							
Yes	93	12.5	650	87.5	743	100	0.700
No	98	11.9	727	88.1	825	100	
Drug consumption in the last 3 months							
Yes	19	10.5	162	89.5	181	100	0.461
No	172	12.4	1,215	87.6	1,387	100	

To determine which factors remained independent predictors of condom failure, variables significant in the bivariate analysis were entered into a multivariate logistic regression model. Table 3 summarizes these results. After adjustment for circumcision status and the number of male clients in the past month, young MSM who did not use water/gel-based lubricants were associated with condom failure (Adjusted Odds Ratio/AOR, 1.79; 95% Confidence Interval/CI, 0.79–4.05). Circumcision status remained statistically associated with condom failure in the final model. Compared with participants who were circumcised, those who were not circumcised had lower adjusted odds of experiencing condom leakage or tearing (aOR 0.21; 95% CI 0.04–0.96). In addition, the number of male clients served in the past month was independently associated with condom failure. Participants who reported serving four or more male clients had higher odds of condom failure compared with those serving three or fewer clients (aOR 1.81; 95% CI 1.00–3.25).

Table 3. Final Results of Multivariate Analysis

Variables	Initial Modeling			Final Modeling		
	p	AOR	95% CI (Low- Up)	p	AOR	95% CI (Low- Up)
Addition of water/gel-based lubricants						
Yes	0.731	reff	0.10 – 4.88	0.015	reff	0.79-4.05
No		0.71			1.79	
Circumcision						
No	0.019	reff	0.34 – 0.91	0.044	reff	0.04-0.96
Yes		0.56			0.21	
Obtaining						
Purchase and free		reff				
Free	0.554	1.72	0.28 – 10.5	-	-	-
Purchase	0.051	9.08	1.01 – 81.3			
Number of sex partners (male and female) in the past week						
≥ 4 people		reff	0.09 – 4.44	-	-	-
≤ 3 people	0.660	0.64				
Purchased sex with men in the past month						
Yes		reff	0.41 – 9.98	-	-	-
No	0.393	2.01				

Variables	Initial Modeling			Final Modeling		
	p	AOR	95% CI (Low- Up)	p	AOR	95% CI (Low- Up)
Reported having exchanged sec for money with men in the past month						
Yes		reff	0.89 – 4.42	-	-	-
No	0.093	1.98				
Number of male customers served in the last month						
≥ 4 people		reff	1.57 0 62.5	reff	1.81	1.00 – 3.25
≤ 3 people	0.015	9.93		0.049		

DISCUSSION

Condom failure, including leakage, tearing, or slippage, can occur either before or during sexual activity and is recognized as a multifactorial issue.[14] One of the most consistently cited causes is incorrect condom use. Mistakes such as failing to pinch the tip to release air, not holding the base during withdrawal, and incomplete unrolling significantly increase the likelihood of breakage.[15,16] For instance, Barrett et al reported that 25% of adolescents failed to unroll condoms to the base of the penis, and nearly half (49.4%) did not hold the base during withdrawal, highlighting persistent gaps in condom application skills.[17] Besides user-related errors, factors such as condom quality and storage conditions also contribute to failure.[15] In this study, 12.2% of young MSM reported experiencing condom leakage or tearing in the past month. This proportion aligns with findings from Nigeria (13.3%) and similar studies among MSM in other settings, where reported failure rates ranged from 4% to over 36% depending on the population and context.[18–20]

Research from Western China and the Philippines further emphasizes the role of inadequate condom education, with poor awareness and incorrect usage commonly reported among young MSM.[21,22] These findings show that comprehensive sexual health education is crucial. A systematic review by Neelan et al found that knowledge and favorable perceptions of condom use could prevent 20%–40% of condom breakage among adolescents.[19] Our study supports this conclusion, showing that young MSM with limited experience or inadequate knowledge of condom use were more likely to experience failure. Notably, 36% of respondents who reported having more than four male sexual partners in the past month also reported condom failure, possibly due to more frequent sexual encounters, rushed preparation, or repeated use of suboptimal techniques. Physiological and mechanical factors may also explain condom failure. Loss of erection during intercourse can result in slippage and potential semen spillage. Similarly, the use of condoms that are either too large or too small may compromise fit and functionality, while expired condoms are more prone to tearing due to material degradation. These physical risks compound behavioral challenges and further highlight the need for proper guidance on condom selection and handling.

The use of lubricants is an important factor influencing condom performance during anal intercourse. Water- or gel-based lubricants reduce friction and are widely recommended by global health authorities because they are compatible with latex condoms and help maintain material quality.[13,23] In contrast, oil-based lubricants can degrade latex and increase the risk of condom tearing.[24] In this study, the use of non-water- or non-gel-based lubricants was associated with higher adjusted odds of condom leakage or tearing; although, this association did not reach statistical significance (AOR, 1.79; 95% CI, 0.79–4.05). These findings are consistent with prior studies indicating that the use of non-compatible substances, such as saliva or lotion, is associated with increased condom breakage, as reported in studies from Benin, Nigeria, and Tanzania.[20,25–27] While a majority of young MSM in our sample reported using water-based lubricants, inconsistency in use remains a concern. Previous research has shown that irregular lubricant application is associated with higher rates of condom failure and sexually transmitted infection symptoms. Together, these findings suggest that consistent use of condoms in combination with compatible lubricants may reduce the likelihood of condom failure, even though the adjusted association observed in this study was not statistically significant. In this study, modifiable behavioural factors included lubricant use, number of sexual partners, and transactional sexual practices, while circumcision status was examined as a clinical factor.

From an intervention perspective, the identified behavioral and mechanical factors, including inconsistent use of water-based lubricants and multiple sexual partnerships, may serve as practical indicators for identifying young MSM at higher risk of condom failure. These findings provide an empirical basis for developing targeted prevention interventions and risk stratification frameworks that prioritize condom-use skills training and consistent access to compatible lubricants. In addition, the observed protective role of water-based lubricant use supports policy advocacy efforts to ensure the availability of free or affordable water-based lubricants and the integration of youth-friendly, MSM-sensitive sexual health services within existing HIV prevention programs.

However, this study is not without limitations. For instance, the IBBS 2018–2019 dataset omits key behavioral and structural variables, such as forced anal intercourse, stigma, and discrimination, which may influence condom misuse. Its cross-sectional design precludes causal inference, while self-reported sexual behaviors may be subject to recall and social desirability bias. The Respondent-Driven Sampling method may underrepresent hidden or non-networked MSM, especially outside urban centers. These limitations must be interpreted in the context of Indonesia's broader structural and social barriers that hinder safe sex practices among MSM. Nonetheless, the IBBS remains a valuable data source for surveillance and program planning, providing standardized and global insights. These findings underscore the urgent need for integrated condom education, improved

access to appropriate lubricants, and structural interventions targeting both knowledge and stigma to reduce condom failure and HIV risk among young MSM. As Indonesia moves toward its national HIV prevention targets, reducing equipment failure through education and access to lubricants should be prioritized as a core public health strategy targeting vulnerable youth populations.

CONCLUSION

Using IBBS data, this study examines behavioural and clinical correlates of condom failure among young MSM in Indonesia. For example, non-water- or non-gel-based lubricants were associated with higher adjusted odds of condom leakage or tearing, although the association was not statistically significant. Condom failure was more commonly observed among participants reporting higher numbers of male clients in the past month. Regarding clinical characteristics, circumcision status was associated with condom failure, with lower odds observed among those who were not circumcised. Taken together, these findings point to the need for stronger condom-use skills training, more consistent access to compatible lubricants, and prevention strategies that prioritize MSM with high partner turnover. Addressing these factors may reduce condom failure and, in turn, limit HIV and STI risk among young MSM in Indonesia.

RECOMMENDATION

We recommend that prevention efforts for young MSM in Indonesia may benefit from greater emphasis on condom-use skills and more consistent use of compatible, water-based lubricants. Condom failure was more commonly reported among participants with a higher number of male clients, suggesting that educational interventions focusing on correct condom application and preparation may be particularly relevant for MSM with high partner turnover. Maintaining access to condoms and water-based lubricants through existing youth-friendly and MSM-sensitive health services could contribute to reducing condom failure. Future rounds of the IBBS may also consider refining measures of lubricant use and condom-use practices to better capture behavioural factors directly related to condom performance.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the Ministry of Health of the Republic of Indonesia for granting access to the 2018–2019 Integrated Biological and Behavioral Survey (IBBS) dataset. We also thank the National AIDS Commission and the IBBS implementing team for their valuable contributions to the data collection process.

REFERENCES

1. UNAIDS. UNAIDS data 2024 [Internet]. 2024 [cited 2025 Feb 25]. Available from: http://www.wipo.int/amc/en/mediation/rules
2. Dyvik EH. LGBTQ+ worldwide - Statistics & Facts [Internet]. Statista. 2024 [cited 2025 Feb 25]. Available from: https://www.statista.com/topics/8579/lgbtq-worldwide/#topicOverview
3. UNAIDS. Fact sheet 2024 - Latest global and regional HIV statistics on the status of the AIDS epidemic [Internet]. 2024 [cited 2025 Feb 25]. Available from: https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf
4. Abdulai R, Phalane E, Atuahene K, Phaswana-Mafuya RN. Consistent Condom and Lubricant Use and Associated Factors Amongst Men Who Have Sex with Men in Sub-Saharan Africa: A Systematic Review. Sexes. 2024;5(4). Available from: https://doi.org/10.3390/sexes5040051
5. Tsuboi M, Evans J, Davies EP, Rowley J, Korenromp EL, Clayton T, et al. Prevalence of syphilis among men who have sex with men: a global systematic review and meta-analysis from 2000–20. Lancet Glob Health. 2021;9(8). Available from: https://doi.org/10.1016/S2214-109X(21)00221-7
6. P3M Ministry of Health. Executive Report on the Development of HIV AIDS and Sexually Transmitted Infectious Diseases (Pims) Semester I Year 2024 [Internet]. Jakarta; 2024 [cited 2025 Feb 25]. Available from: https://hivaids-pimsindonesia.or.id/download
7. WHO. Global HIV, Hepatitis and STIs Programmes [Internet]. WHO. 2023 [cited 2025 Feb 25]. Available from: https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/populations/men-who-have-sex-with-men
8. Gray J, Prestage G, Jin F, Phanuphak N, Friedman RK, Fairley CK, et al. Condom Failure Among HIV-Negative Men in Serodiscordant Relationships in Australia, Brazil, and Thailand. AIDS Behav. 2024;28(11). Available from: https://doi.org/10.1007/s10461-024-04431-x
9. Scheinfeld E. Shame and STIs: An Exploration of Emerging Adult Students' Felt Shame and Stigma towards Getting Tested for and Disclosing Sexually Transmitted Infections. International Journal of Environmental Research and Public Health 2021, Vol 18, Page 7179. 2021;18(13). Available from: https://doi.org/10.3390/ijerph18137179
10. Silva S, Romão J, Ferreira CB, Figueiredo P, Ramião E, Barroso R. Sources and Types of Sexual Information Used by Adolescents: A Systematic Literature Review. Healthcare (Switzerland). 2024;12(22). Available from: https://doi.org/10.3390/healthcare12222291
11. Jabr AM, Di Stefano M, Greco P, Santantonio T, Fiore JR. Errors in Condom Use in the Setting of HIV Transmission: A Systematic Review. Open AIDS J. 2020;14(1). Available from: https://doi.org/10.2174/1874613602014010016
12. Amogne MD, Agardh A, Abate E, Ahmed J, Asamoah BO. Determinants and consequences of heavy episodic drinking among female sex workers in Ethiopia: A respondent-driven sampling study. PLoS One. 2021;16(5). Available from: https://doi.org/10.1371/journal.pone.0252432
13. Abdulai R, Phalane E, Atuahene K, Kwao ID, Afriyie R, Shiferaw YA, et al. Consistency of Condom Use with Lubricants and Associated Factors Among Men Who Have Sex with Men in Ghana: Evidence from Integrated Bio-Behavioral Surveillance Survey. International Journal of Environmental Research and Public Health 2025, Vol 22, Page 599. 2025;22(4). Available from: https://doi.org/10.3390/ijerph22040599
14. Fields EL, Hussen SA, Malebranche DJ. Mind the Gap: HIV Prevention Among Young Black Men Who Have Sex with Men. Curr HIV/AIDS Rep. 2020;17(6). Available from: https://doi.org/10.1007/s11904-020-00532-z
15. Murudi-Manganye NS, Mashau N, Ramathuba D. Factors Associated With Risky Sexual Behaviour Amongst Students at a Training College in Limpopo Province, South Africa. Research Square (Research Square). 2020; Available from: https://doi.org/10.21203/rs.3.rs-136350/v1
16. Evans WD, Ulasevich A, Hatheway M, Deperthes B. Systematic Review of Peer-Reviewed Literature on Global Condom Promotion Programs. Int J Environ Res Public Health. 2020;17(7). Available from: https://doi.org/10.3390/ijerph17072262

17. Barrett M, Laris BA, Anderson P, Baumler E, Gerber A, Kesler K, et al. Condom Use and Error Experience Among Young Adolescents: Implications for Classroom Instruction. Health Promot Pract. 2021;22(3). Available from: https://doi.org/10.1177/1524839920935431
18. Restar A, Ogunbajo A, Adia A, Nazareno J, Hernandez L, Sandfort T, et al. Using structural equation modelling to characterise multilevel socioecological predictors and mediators of condom use among transgender women and cisgender men who have sex with men in the Philippines. BMJ Glob Health. 2020;5. Available from: https://doi.org/10.1136/bmjgh-2020-002463
19. Neelan T, Knab J, Forrester EJ, Chesnut K, Kelly K, Zief S. The Impact of Brief Interventions With Condom Demonstrations on Youth: A Systematic Review. Journal of Adolescent Health. 2023;73(5). Available from: https://doi.org/10.1016/j.jadohealth.2023.06.020
20. Hu L, Luo Y, Zhong X, Lu R, Wang Y, Sharma M, et al. Condom Use and Related Factors among Rural and Urban Men Who Have Sex With Men in Western China: Based on Information-Motivation-Behavioral Skills Model. Am J Mens Health. 2020;14(1). Available from: https://doi.org/10.1177/1557988319899799
21. Abbafati C, Abbas KM, Abbasi M, Abbasifard M, Abbasi-Kangevari M, Abbastabar H, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet. 2020;396(10258).
22. Cleveland Clinic. Condoms [Internet]. Cleveland Clinic. 2024 [cited 2025 Apr 15]. Available from: https://my.clevelandclinic.org/health/treatments/9404-condoms
23. WHO. Condoms [Internet]. WHO. 2025 [cited 2025 Apr 15]. Available from: https://www.who.int/news-room/fact-sheets/detail/condoms
24. Fatiah MS, Purba R, Mollet GCC, Bela SRA. The Effect of Being Faithful, Condom Use, no Drug Behavior on the Incidence of Sexually Transmitted Infections (STIs) in UnmarriedMen Who Have Sex with Men (MSM) in Indonesia. Unnes Journal of Public Health. 2025;14(1). Available from: https://doi.org/10.15294/ujph.v14i1.4670
25. Mmbaga EJ, Leyna GH, Leshabari MT, Moen K. Early Anal Sex Experience Among Men Who Have Sex with Men in Dar Es Salaam Tanzania: Implications for HIV Prevention and Care. Arch Sex Behav. 2020;49(6). Available from: https://doi.org/10.1007/s10508-019-01529-5
26. Fatiah MS. Being Faithful, Condom Use, No Drug Use and Circumcision Behavior in Men Sex with Men Group. Jurnal Promosi Kesehatan Indonesia. 2025;20(2).). Available from: https://doi.org/10.14710/jpki.20.2.138-147
27. Hessou SPH, Glele-Ahanhanzo Y, Adekpedjou R, Ahoussinou C, Djade CD, Biaou A, et al. HIV incidence and risk contributing factors among men who have sex with men in Benin: A prospective cohort study. PLoS One. 2020;15(6). Available from: https://doi.org/10.1371/journal.pone.0233624

Declarations

Author contribution	:	Mona Safitri Fatiah was responsible for the entire research project. She also led the writing of the manuscript and the collaboration with the second author. He also revised the manuscript Shely Novita Mamorino participated in the data collection. Both authors approved the final manuscript.
Funding statement	:	This research did not receive any funding.
Conflict of interest	:	Both authors declare that they have no competing interests.
Additional information	:	No additional information is available for this paper.