

Non-randomised evaluation of comprehensive HIV prevention information package on risky sexual behavior among youth in Kakamega and Kericho counties, Kenya

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Abstract

HIV remains the most significant public health and development challenge in the world. In sub-Saharan Africa, the youth bear the biggest brunt of HIV epidemic. Despite the availability of HIV prevention options, new infections among youth in Kenya only reduced by 59 % between 2015 and 2019. Various HIV prevention interventions have been implemented among youth with little or no assessment of their effectiveness in reducing new HIV infections. The objective of the study was to investigate effect of comprehensive HIV prevention information package on the risky sexual behavior among youth in Kakamega and Kericho counties, Kenya. A non-randomized control trial was conducted with Kakamega as intervention and Kericho as Comparison County. The pretest questionnaire was administered in both intervention and control counties in December 2001. The posttest questionnaire was administered in both intervention and control counties after nine months of providing HIV prevention information package. Quantitative data was analyzed using descriptive and inferential statistics. There was a shift in comprehensive HIV knowledge at the end line compared to the baseline ($P < 0.05$). Condom use at endline was higher in the intervention county at 78.8 % compared to comparison county at 73.0 %. The number of youths who had two or more sexual partners reduced at endline to 17.6% from 23.7% in intervention county. Concurrent partnerships significantly reduced by gender ($\chi^2 1.507, p=0.003$). The findings from the study will inform national rollout of the intervention to contribute to safer sexual behaviors among youth.

Keywords: Comprehensive; Concurrent partnership; Non-randomised; Sexual behavior

1. Introduction

Human immunodeficiency virus (HIV) remains the most significant public health and development challenge in the world. Efforts to reduce new HIV infections to fewer than 370 000 worldwide by 2025 have been off-track. Globally, over 1.5 million people became newly infected with HIV in 2021 compared with 1.6 million in 2019 representing 7 % decline. Approximately 400 000 young people aged 15 -24 years in the world were newly infected with HIV in 2021 down from 450 000 in 2019[1].

The Sub-Saharan African region had approximately 860 000 new HIV infections in 2021 compared to 990 000 in 2019 representing a 15 % decline. An estimated 269 000 young people aged 15-24 years got newly infected in 2021 in the Sub-Saharan region down from 332 100 in 2019. The East and South African region had the highest reduction in new HIV infections at 38 % since 2010. An estimated 220 000 young people aged 15-24 years got newly infected in 2021 in the region down from 250 000 in 2019[1]. Only 30% males and 19 % females aged 15-24 in sub Saharan Africa have comprehensive knowledge on HIV. The Median condom use by men at last higher risk sex was only 58.6%, far from the global target of 90% by 2020 [2] .

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New HIV infections in Kenya have stabilized at an average of 34 540 people down from 41 408 in 2019[3]. Young people aged 15-24 years contribute 42 % of all new HIV infections in Kenya. The high new HIV infections can be attributed to casual sex with multiple partners, limited comprehensive information on HIV prevention and inconsistent and incorrect condom use. Only 42.6% of females and 69.6% of males aged 15-24 years with more than one sexual partner in the past 12 months reported using a condom during their last sexual intercourse. Additionally, only 54 % females and 55 % males in this age group have comprehensive knowledge of HIV prevention[4].

Kakamega and Kericho county have a projected population of 1 867 579 and 995 566[5]. New HIV infections among young people in Kakamega and Kericho counties only reduced by 32 and 18.4 % respectively between 2020 and 2022. Young people aged 15-24 years in Kakamega and Kericho counties contribute 31 % and 39 % of all new HIV infections in the county respectively[3].

2. Material and methods

2.1. Research Design

Objectives of this study were achieved through a Nonrandomized control trial using qualitative and quantitative methods. The pretest questionnaire was administered in both intervention and comparison counties in December, 2021. The posttest questionnaire was also administered in September, 2022 after nine months of providing HIV prevention information package in the intervention county. Nonrandomized control trial is used when random assignment of individuals into treatment and comparison group is not possible. The study gained from the advantage of Nonrandomized trial that include reducing the time and resources required because extensive pre-screening and randomization is not required.

2.2. Variables

The comprehensive HIV prevention information package for young people formed the intervening variable. The increased condom uptake and reduced concurrent partnerships were the dependent variables. The socio-demographic, social economic and health system factors were the independent variables which influenced the dependent variables which inform attitude and safer sexual practices among the young people.

2.3. Study site

The study was undertaken in Kakamega as intervention and Kericho as comparison county. These two were purposively selected because they are medium incidence [3]. The three sub counties in the two counties were randomly selected to represent urban, cosmopolitan and rural youth.

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2.4. Study Population

The research population of interest were all youth in Kakamega and Kericho County. A target of 495 youth was the study subjects. The participants were selected from youth group meetings to represent out of school youth and from colleges and technical institutes to represent the in school youth in the intervention and comparison county. Consenting young people residing in the intervention and control counties between December 2021 and September 2022 were the study participants.

2.5. Inclusion Criteria

- Confirmed young person residing in the study counties
- 15 -24 years and able to give informed consent
- Youth below 18 years who assent in addition to parental consent

2.6. Exclusion Criteria

- Young people not residing in the study counties
- Young people who don't consent
- Young people below 18 years who don't assent and whose parents don't consent for them

2.7. Sampling Techniques and Sample Size Determination

The two counties, Kakamega and Kericho were purposively selected as intervention and comparison county. Stratified sampling was used to select three sub counties to represent urban, cosmopolitan and rural youth. Simple random sampling was used to select colleges or technical institutes to represent in-school youth and youth groups to represent out of school youth in the study counties. Individual youth who consent in both counties were invited to fill a questionnaire at baseline and after 9 months of providing comprehensive HIV prevention information package in the intervention county. Consecutive sampling was used to include all accessible individual study participants to provide information on the study questions. The change in uptake of condoms and concurrent sexual partners in the intervention sub counties was compared with the comparison sub counties.

2.8. Sample size Determination

For intervention studies, [6] developed the following formula that was used to calculate a representative sample size for the study.

$$n = DEFF \times \frac{\left[Z_{\alpha/2} \sqrt{2\bar{p}\bar{q}} - Z_{1-\beta} \sqrt{p_1q_1 + p_2q_2} \right]^2}{(p_1 - p_2)^2}$$

Where

N: Sample size required from each condition (pre- and post-intervention)

p₁: The estimated proportion of comprehensive knowledge at baseline survey

p₂: The estimated proportion of comprehensive knowledge at follow-up survey

DEFF: The estimated design effect - here it is assumed the DEFF will be the same for both surveys

A: Level of significance (“alpha”), 5% (corresponds with 95% confidence interval)

1- β Power, assumed 80%

$$\bar{p} = \frac{p_1 + p_2}{2} \text{ and } \bar{q} = 1 - \bar{p} \text{ when sample sizes are to be equal}$$

$$q_1 = 1 - p_1$$

$$q_2 = 1 - p_2$$

Z_{α/2} is the Z-value for the level of significance

Z_{1-β} is the Z-value for the Power

According to the Kenya Demographic and Health Survey, only 59 % of youth in Kenya have comprehensive knowledge on HIV and AIDS[7]. We estimate that the intervention will increase comprehensive knowledge among this age group by 10%. We assumed a design effect of 1.25 to account for within-county clustering, and a desired precision of ±5% points. We increased the sample size by 10% to account for incomplete data.

$$p_1 = .59, q_1 = .41$$

$$p_2 = .69, q_2 = .31$$

$$\alpha = .05, \text{ therefore } Z_{\alpha/2} = 1.96$$

$$\beta = .20, \text{ therefore } Z_{1-\beta} = .842$$

$$DEFF = 1.25$$

Need to calculate \bar{p} , for equal sample sizes:

$$\bar{p} = \frac{.59 + .69}{2} = .64, \bar{q} = 1 - .64 = .36$$

$$n = 1.25 \times \frac{\left[1.96\sqrt{2(.64)(.36)} - (-.842)\sqrt{(.59)(.41) + (.69)(.31)} \right]^2}{(.59 - .69)^2} = 1.25 \times \frac{3.604}{.01} \approx 450$$

Adjusting for 10% non-response rate [8].

$$n = \frac{450 * 110}{100} = 495 \text{ subjects}$$

The sample size was 495 youth for the baseline survey and 495 in the follow-up survey. We will use stratified probability proportional to size (PPS) method [9] to obtain the number of young people to be sampled per county. The population of interest in each county was sampled proportional to its size.

Table 1 Sampling of youth from study counties

Sr.No.	County	Youth (15-24 years) population	Sample
1	Kakamega	388 255	331
2	Kericho	192 767	164
3	Total	581022	495

College youths were obtained from the college or technical institution in the selected sub counties. The tertiary institution was selected by simple random sampling while the individual youth were selected by consecutive sampling. Two colleges or technical institutes were sampled per Sub County.

Table 2 Sampling frame for college youth

S.N	Sub county	College/Technical institute	No of Youth	Sample
1	Lurambi	Sigalagala National Plytechnic, Town campus	600	39
		Kakamega Polytechnic	465	31
		Subtotal	1065	70
2	Lugari	Chekalini County polytechnic	128	13
		Kabras county polytechnic	296	29
		Subtotal	424	42
3	Navakholo	Navakholo Technical and Vocational college	642	36
		Emulaha Vocational Training Centre	306	17
		Subtotal	948	53
4	Ainamoi	Kericho Teachers Training College	996	18
		Kericho Township Technical and Vocational college	937	16
		Subtotal	1933	34
5	Kipkelion East	Kimasian Technical and Vocational College	721	16
		Chepseon Youth Polytechnic	303	07

	Subtotal		1024	23
6	Sigowet/Soin	Kiptere Vocational Training Centre	350	18
		South Rift Technical Training Institute	146	07
	Subtotal		496	25
	Total Sample			247

Respondent Driven sampling was used to determine the remaining 248 out of school youth. The youth were sampled purposefully from each subcounty at congregation points, youth meetings, outreaches and motorbike stages.

2.9. Pre-Testing

Pre-test study was conducted using 50 youth in Machakos County that form 10 % of the sample size. Data was collected from 25 youth in a randomly selected sample of 3 youth groups and 25 young people from two Colleges or technical institutes in Machakos County. Data was collected through use of detailed questionnaire, structured interviews and some use of direct observation. The pretest county is medium incidence and was characteristically similar to participant counties. Pre-testing of instruments was also intended to improve clarity, precision, reliability and validity of data. Following analysis of the pretest study data, ambiguous or unclear questions were either be rephrased or removed.

2.10. Validity

A questionnaire was comprehensive enough to collect all the information needed to address the purpose and objectives of the study. A field test was conducted before the questionnaire was used for the pilot study. To test validity, the questionnaire was also be reviewed by my supervisors at Kenyatta University. Data from other sources was compared with results from this study. The findings from this study can be generalized for the effect comprehensive HIV prevention information package on risk sexual behavior among youth in Kenya.

2.11. Reliability

Pretesting the questionnaire helped enhance reliability of the instrument. The Research Assistants were trained on administering the research instruments. Reliability was established using a pilot test by collecting data from subjects not included in the sample. The same questionnaire was used during the interviews and all its subparts were measured using the same characteristic. To increase reliability of data collected, efforts for triangulation was undertaken including performing two separate interviews per county in addition to direct observation made.

2.12. Data Collection Techniques

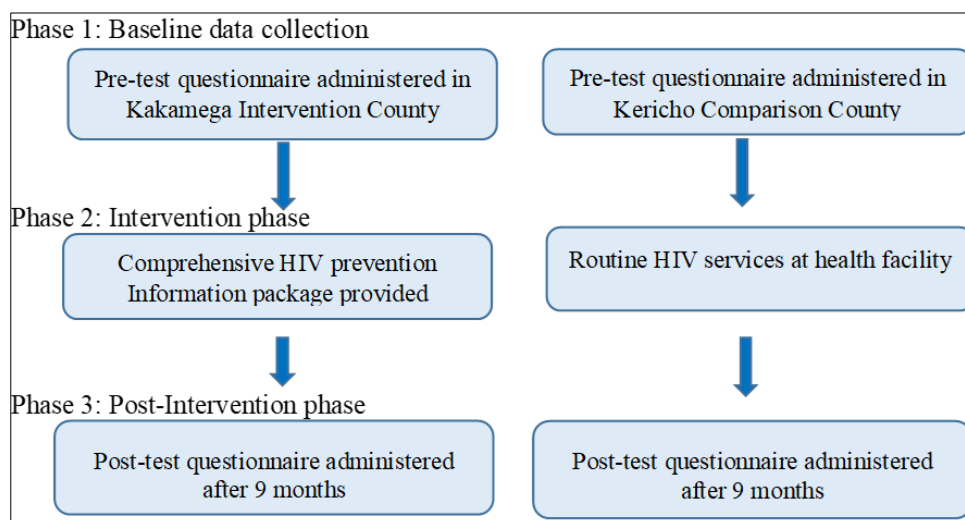


Figure 1 Intervention flow chart

The primary data was collected from respondents by using a self-administered questionnaires which had both structured and unstructured questions. Four key informant interviews were also conducted with program

implementers to establish HIV prevention strategies available for young people. Six Focus Group Discussions with 8-10 youth was conducted for the qualitative study. A similar questionnaire was administered at baseline and end line period in both intervention and comparison county. The questionnaire also collected information on potential confounding factors such as age, gender, residence and other prevention programmes that they had attended. The post test data was collected 9 months after implementing the comprehensive HIV prevention information package. Data was checked for completeness and internal consistency throughout the data collection period. The questionnaire together with participants' responses was then coded and entered into a computer for analysis.

2.13. Delivery of Intervention Package

The comprehensive HIV prevention information package was provided to the youth in the intervention county after the baseline assessment. The HIV prevention information package had 3 contact sessions offered termly for 9 months. Each contact session was 3 hours long consisting of presentation, experience sharing, group discussion and practical demonstration. The package consisted of frequently asked questions on HIV and AIDS, overview of HIV including transmission and prevention options, condom use dialogue, key HIV and STIs messages and documentary. Youth in the comparison county continued to receive routine HIV services offered at health facilities. The pretest questionnaire was administered at baseline while the end line questionnaire was administered after 9 months of providing the HIV prevention information package to the youth in the intervention county.

2.14. Data analysis

The qualitative data was transcribed and translated then entered into NVivo qualitative data software for coding and further analysis. The quantitative data was entered into SPSS and analyzed using descriptive statistics. These include mean, median, frequencies and standard deviation. The Difference-In-Difference (DID) regression model was used to compare outcomes between intervention and comparison county at baseline and after 9 months of the intervention at end line. A Chi square test was used to determine the effect of the comprehensive HIV prevention information package and testing for any significant difference. Potential confounders were measured at baseline and end line.

3. Results

3.1. Comprehensive HIV knowledge

A comparison of the levels of knowledge on HIV prevention in the two counties was done at the baseline and at the end line using independent t-test with variance not equal ($P \leq 0.05$). At the baseline there were significant differences in knowledge of the youths in Kericho from those in Kakamega on; abstinence, having one sex partner and opinion on getting HIV from mosquito bite. Comprehensive HIV knowledge was also different in the two counties during the end line except opinion on "getting HIV from mosquito bite" and the possibility of "a HIV infected woman giving birth to a child not infected" and "getting HIV by sharing food with someone infected". At the end of the research, HIV knowledge of the youth from Kakamega were significantly higher in the test items than those in Kericho.

Table 3 Comparison of knowledge on HIV prevention in Kericho to Kakamega youths at baseline and at end line

Statement	At baseline			At end line		
	Kakamega	Kericho	P-value	Kakamega	Kericho	P-value
People reduce their chance of having HIV virus by abstaining from sex	247(74.6%)	134(81.7%)	0.036	325(98.2%)	126(76.8%)	0.0001
People reduce their chance of getting HIV virus by having just one uninfected sex partner who has no other sex partners	181(54.7%)	107(65.2%)	0.039	311(93.9%)	93(56.7%)	0.0001
People reduce their chance of getting HIV virus by using a condom every time they have sex	249(75.2%)	117(71.3%)	0.803	321(96.9%)	116(70.7%)	0.0001
It is possible for a health looking person to be HIV infected	216(65.3%)	124(75.6%)	0.012	304(91.8%)	106(64.6%)	0.0001

A person can get HIV virus from mosquito bite	55(16.6%)	17(10.4%)	0.022	10(3.0%)	19(11.6%)	0.001
It is possible for a woman infected with HIV to give birth to a child not infected with HIV	270(81.6%)	142(86.6%)	0.281	317(95.8%)	124(75.6%)	0.0001
A person can get HIV by sharing food with someone who is infected with HIV	25(7.6%)	5(3.0%)	0.080	2(0.6%)	11(6.7%)	0.001
A person can get HIV because of witchcraft or other supernatural means	15(4.5%)	2(1.2%)	0.131	4(1.2%)	6(3.7%)	0.108

3.1.1. Condom use

The percentage of youth who reported using condoms during the last time they had sex was higher at endline compared to baseline. Condom use was also higher in intervention county than comparison county at endline. The youths who used condoms the last time they had sex at baseline and those who used condoms at the end of the study were as indicated in figure 3.

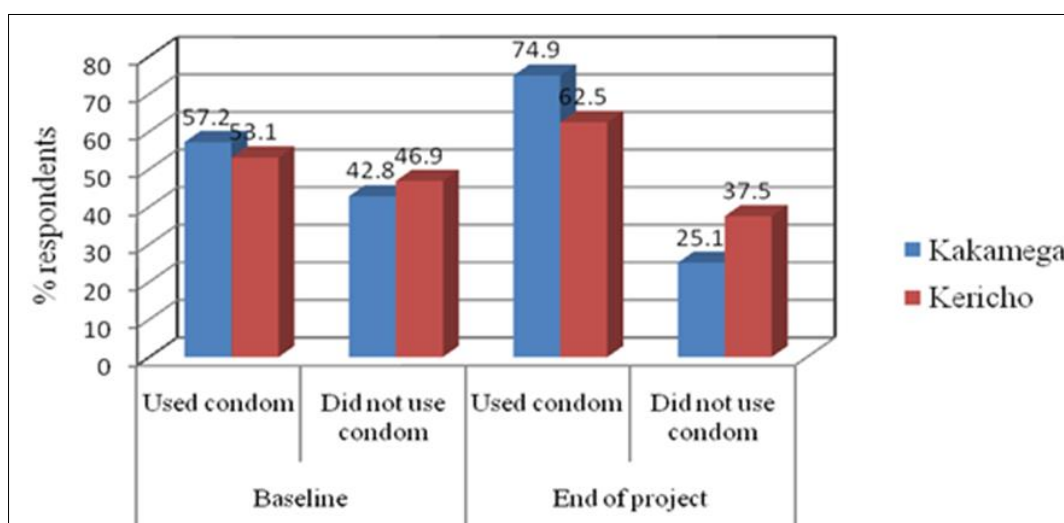


Figure 2 Use of condoms in the two counties at baseline and end of study

The Suggestions to use condoms during sex was made by either the respondents themselves, by their partners or as a joint decision. Association of the suggestion by respondents gender found out that there was a significant association by gender ($\chi^2 = 10.297$, $P = 0.016$). In most of the instances, male respondents themselves suggest use of condoms for their female partners. For the female respondents, they either suggest use of condoms by themselves to their partners or it is a joint decision.

Table 4 Suggestion for the use of condoms

Gender	Suggestion for use of condoms				Total
	Self	Partner	Joint decision	Do not remember	
Male	90 (42.9%)	51 (24.3%)	40 (19.0%)	29 (13.8%)	210
Female	77 (37.7%)	34 (16.7%)	65 (31.9%)	28 (13.7%)	204
χ^2 - value			10.297		
P- value			0.016		

3.2. Concurrent sexual partners

The youths were asked to state; whether they were in any sexual relationship and the number of different people they had sex with in the last nine months. The findings revealed that a total of 380 youths (76.8%) were in a sexual relationship while 23.2% were not. In Kakamega, the number of youths who had two or more sexual partners reduced during the end of the survey to 17.6%) from the previous 23.7%. Similar reduction was also noted in Kericho County, where the percentage reduced to 36.6% at the end of the survey.

Table 5 Percentage of youths in sexual relationship in Kakamega and in Kericho at baseline and at end of the survey

	Baseline		End of survey	
	Kakamega	Kericho	Kakamega	Kericho
Youths in sexual relationship	198 (65.6%)	102 (66.7%)	279 (84.5%)	101 (56.4%)
Youth having one partner	116 (59.2%)	9 (8.9%)	193 (69.2%)	50 (49.5%)
Youths having two or more partners	47 (23.7%)	62 (61.4%)	49 (17.6%)	37 (36.6%)

3.3. Concurrent sexual partners by gender

During the end of the survey, 13.7% of the male youths in Kakamega had two or more sexual partners while in Kericho, there was more youths, 32.4% of the males. In Kakamega, less females (6.4%) compared to males had two or more sexual partners. Similarly less females in Kericho (11.4%) than males.

Table 6 Gender of the youth having one, two or more sexual partners in the counties

County	Demography	Category	Number of sexual partners in last nine months			
			One	Two or more	χ^2 - value	P -value
Kakamega (N = 249)	Gender	Male	83 (33.3%)	34 (13.7%)	11.507	0.003
		Female	116(46.6%)	16 (6.4%)		
Kericho N =105)	Gender	Male	31 (29.5%)	34 (32.4%)	4.791	0.091
		Female	28 (26.7%)	12 (11.4%)		

3.4. Condom use among sexually active youth

At the endline of this study, 60.6% of the youth were in sexual relationship and 48.1% used condoms anytime they had sex.

Table 7 Youths in sexual relationships and condom use among the youth

Statement	In a sexual relation		
	Yes	No	Non committal
In sexual relationship	300 (60.6%)	155 (31.3%)	40 (8.1%)
Use condoms anytime when having sex	238 (48.1%)	188 (38.0%)	69 (13.9%)

4. Discussion

There was significant difference in comprehensive HIV knowledge of the youth from Kakamega than those in Kericho after the intervention. This concurs with a quasi-experimental study that examined the effectiveness of an education intervention that improved the knowledge on HIV prevention among first year university students in China [10]. The findings in similar study on effects of a sexuality education programme on young people's STI/HIV knowledge, attitudes and risk behaviour in Northeast Nigeria showed significant post-intervention improvements in students' HIV and STIs knowledge, attitudes and practices in the experimental group[11].

Condom use was higher in the intervention county than comparison county at endline. Similarly, there was a significant difference in percentage of youth in intervention county to comparison county who plan to use condoms in future ($\chi^2=100.236$, $P = 0.0001$). This concurs with a peer education intervention in selected schools Northern Malawi that resulted in increasing condom use and lowering multiple sexual partnerships in the intervention after 8 months [12]. A similar cross sectional -quantitative study that was conducted to assess the impact of comprehensive HIV prevention interventions on the sexual behavior of oil and gas workers in Bonny Island, Nigeria succeeded in tripling condom use among respondents after the intervention [13].

The number of youths who had two or more sexual partners reduced during the end of the survey to 17.6% from 23.7% in the intervention county. Similar reduction in the number was also noted in the comparison County, where the number was reduced to 36.6% at the end of the survey. During the endline survey, 13.7% of the male youths in intervention county had two or more sexual partners while in comparison county, there was more youths, 32.4% of the males. In intervention county, less females (6.4%) compared to males had two or more sexual partners. $\chi^2=11.507$, $P = 0.003$. This is contrary to a resilience-based HIV prevention intervention to reduce risky sexual behaviour among youth in South Africa that participants at the 3-month follow-up had a higher propensity to engage in multiple sexual partnerships, transactional sex and intergenerational sex than baseline [14]. A similar study on Effect of comprehensive knowledge of HIV on risky sexual behaviours associated with HIV transmission among adult Ugandans increased consistent condom use among those in multiple sexual relationships [15].

5. Conclusion

Despite the high comprehensive HIV knowledge, the youth sampled have low risk perception and still engaged in risky sexual behaviors that increased their exposure to HIV infection. The comprehensive HIV prevention information package was successful in increasing the young peoples' HIV- and AIDS-related knowledge and attitudes, and in promoting safer sexual behaviors. The condom advocacy and dialogue forums increased condom uptake among the youth.

The comprehensive HIV prevention information package however did not significantly reduce concurrent sexual partners among youth

Recommendations

- Review the minimum package for young people in the Fast Track plan to include Frequently asked questions on HIV and AIDS and Condom use dialogue
- Utilize existing infrastructure and delivery platforms for national roll-out of the comprehensive HIV prevention package
- Further studies need to be done on effect of comprehensive HIV prevention information package on teen pregnancy and sexual and gender based violence and effects of mobile based HIV prevention messaging on risky sexual behavior among youth.

Compliance with ethical standards

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Disclosure of conflict of interest

The Authors of this paper declare that there is no conflict of interest in the publication and the research is purely based on findings.

Statement of ethical approval

Proposal was submitted to Ethical Review Committee, Kenyatta University for approval before start of the study. The research permit was obtained from NACOSTI. Kakamega and Kericho counties gave clearance to collect data from colleges and youth groups.

Statement of informed consent

Written informed consent was obtained from all the study participants. No participant name appeared on the questionnaire. Participants were informed that there will be no penalties for declining to participate or for withdrawing from the study in the course of data collection. Access to database was restricted by password.

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