

ADOLESCENT PARTICIPATION IN YOUTH INFORMATION AND COUNSELLING CENTRE IMPROVES BETTER KNOWLEDGE ON HIV AIDS AND EARLY MARRIAGE PREVENTION***Ike Anggraeni¹, Annisa Nurrachmawati¹, Irda Triani Putri²**¹Faculty of Public Health, Mulawarman University, 75242 Samarinda, East Kalimantan, Indonesia²National Family Planning and Population Board, 75126 Samarinda, East Kalimantan, Indonesia***Corresponding Author:** Ike Anggraeni ; email: ikeanggraeni.fkm@unmul.ac.id

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ABSTRACT**Keywords:**adolescence reproductive health,
HIV/AIDS,
early marriage,
digital access,
peer based education.

Youth Information and Counseling Centers (YICC) aim to enhance adolescents' reproductive health knowledge through peer-based education. Despite their significance, the effectiveness of such programs remains inadequately evaluated, especially in Indonesia, where adolescent reproductive health challenges, such as early marriage and HIV/AIDS, persist. This study explores the relationship between YICC participation and adolescents' knowledge of HIV/AIDS and early marriage prevention in East Kalimantan. A cross-sectional survey was conducted among 830 adolescents aged 10-24 using a validated online questionnaire. Descriptive statistics, Kruskal-Wallis tests, ANCOVA, and logistic regression were employed to analyze knowledge differences and predictors, controlling for sociodemographic factors. Results revealed that 71.8% of adolescents were aware of YICC, yet only 38.2% participated in its activities, and 21.4% were formal members. YICC participants showed significantly greater knowledge of HIV/AIDS and the ideal marriage age ($p < 0.01$), though no significant differences were found in attitudinal scores. ANCOVA indicated that YICC participation was an important predictor of knowledge, even after adjusting for parental education, internet access, and residence. Logistic regression further showed that YICC participants were 1.9 times more likely to possess high knowledge compared to non-participants (AOR = 1.90; 95% CI: 1.30-2.70; $p = 0.001$). Key predictors of higher knowledge included parental education, internet access, and urban residence. These findings highlight the importance of increasing YICC participation and integrating digital and school-based strategies to enhance adolescent reproductive health education.

ABSTRAK**Kata Kunci:**kesehatan reproduksi remaja,
HIV/AIDS,
usia pernikahan dini,
pendidikan sebaya,
akses digital,
pendidikan teman sebaya

Pusat Informasi dan Konseling Remaja (PIK-R) bertujuan untuk meningkatkan pengetahuan kesehatan reproduksi remaja melalui pendidikan berbasis sebaya. Meskipun penting, efektivitas program ini belum dievaluasi secara menyeluruh, khususnya di Indonesia, di mana masalah kesehatan reproduksi remaja, seperti pernikahan dini dan HIV/AIDS, masih menjadi tantangan besar. Penelitian ini mengeksplorasi hubungan antara partisipasi PIK-R dan pengetahuan remaja tentang pencegahan HIV/AIDS dan pernikahan dini di Kalimantan Timur. Survei potong lintang dilakukan terhadap 830 remaja berusia 10-24 tahun dengan menggunakan kuesioner online yang telah divalidasi. Statistik deskriptif, uji Kruskal-Wallis, ANCOVA, dan regresi logistik digunakan untuk menganalisis perbedaan pengetahuan dan faktor prediktor, dengan mengontrol variabel sosiodemografis. Hasil penelitian menunjukkan bahwa meskipun 71,8% remaja mengetahui PIK-R, hanya 38,2% yang berpartisipasi dalam kegiatannya, dan 21,4% menjadi anggota formal. Partisipan PIK-R menunjukkan pengetahuan yang signifikan lebih tinggi mengenai HIV/AIDS dan usia ideal untuk menikah ($p < 0,01$), namun tidak terdapat perbedaan signifikan dalam skor sikap. ANCOVA mengonfirmasi bahwa partisipasi PIK-R tetap menjadi prediktor signifikan pengetahuan setelah disesuaikan dengan pendidikan orang tua, akses internet, dan tempat tinggal. Regresi logistik menunjukkan bahwa remaja yang berpartisipasi di PIK-R memiliki kemungkinan 1,9 kali lebih besar untuk memiliki pengetahuan tinggi dibandingkan non-partisipan (AOR = 1,90; 95% CI: 1,30-2,70; $p = 0,001$). Temuan ini menekankan pentingnya meningkatkan partisipasi PIK-R dan mengintegrasikan platform digital serta strategi berbasis sekolah untuk meningkatkan literasi kesehatan reproduksi remaja.

INTRODUCTION

Adolescence is a critical phase marked by significant biological, psychosocial, and experiential changes (1). This phase is fraught with unique challenges, particularly related to reproductive health and sexual behavior. Disruptions during this transition may lead to adverse lifelong consequences. Early pregnancy, for instance, poses physical risks and threatens educational and socio-economic prospects for young girls (2–4). Adolescents are also more vulnerable to infections such as HIV, sexually transmitted infections (STIs), and sexual exploitation, which can have lasting effects on their physical and mental well-being (5).

Youth Information and Counseling Centers (YICC) are designed to provide reproductive health information and services through peer-based education. These centers play a crucial role in promoting family planning and reproductive health awareness among adolescents (6). However, a significant gap in YICC participation exists, which could limit the effectiveness of these initiatives. Previous research has shown that disparity in participation is crucial as it may hinder the broader reach of health education, particularly in rural and underserved areas. For example, in Kendari, South-East Sulawesi, adolescents with limited access to sexual health education were more likely to engage in risky behaviors, including unprotected sex, which increases the risk of STIs and unintended pregnancies (7,8). The gap in participation in YICC programs emphasizes the importance of enhancing access to and engagement in these centers to address reproductive health challenges more effectively.

Despite the high demand for reproductive health services among adolescents, participation in YICC activities remains low (9,10). Although 71.8% of adolescents in East Kalimantan are aware of the existence of YICC, only 38.2% have participated in its activities, and only 21.4% are formal members (11). This study aims to examine the association between YICC participation and adolescents' knowledge of HIV/AIDS and early marriage prevention in East Kalimantan. The findings will provide valuable insights into the effectiveness of YICC programs and highlight areas for improving adolescent engagement and education on reproductive health.

METHODS

This study utilized a cross-sectional survey design to evaluate the relationship between participation in Youth Information and Counseling Centers (YICC) and adolescents' knowledge of HIV/AIDS and early marriage prevention in East Kalimantan. A stratified random sampling method was employed to ensure representation from both urban and rural areas. The study targeted adolescents with a final sample of 830 participants. Inclusion criteria were adolescents within the age range of 10 to 24 years who were willing to participate and provide informed consent. Exclusion criteria included adolescents who were not residing in East Kalimantan at the time of the survey and those with cognitive or physical impairments that would hinder their ability to complete the survey.

Data collection was conducted through a structured and validated online questionnaire, disseminated using a dual-distribution approach to maximise response rates and sample representativeness. First, the survey link was shared via popular social media platforms frequented by adolescents. Second, to further enhance coverage and inclusivity, the questionnaire was distributed through all Guidance and Counseling (*Bimbingan dan Konseling/ BK*) teachers in senior high schools (*Sekolah Menengah Atas/ SMA*) across East Kalimantan who have an established collaboration with the Faculty of Teacher Training and Education, Mulawarman University. These BK teachers acted as facilitators by sharing the survey link directly with eligible students in their respective schools. Engaging the entire network of collaborating BK teachers, the sampling approach mitigated the inherent limitations of purely online convenience sampling by leveraging trusted educational channels, thus increasing the likelihood of reaching a demographically diverse adolescent population. This method also strengthened the representativeness of the sample across different subgroups defined by geographical location and school settings. However, the online sampling method may have response bias, as adolescents with limited internet access or lower engagement with social media platforms may be underrepresented (12). Despite this, the combined approach of online distribution and teacher facilitation aimed to

strengthen the representativeness of the sample across different subgroups defined by geographical location and school settings.

Ethical standards were rigorously upheld throughout the study. Digital informed consent was obtained from all participants before survey completion. Participant anonymity and confidentiality of responses were strictly maintained, in accordance with ethical approval granted by the Faculty of Medicine, Mulawarman University (No.184/KEPK-FK/XI/2022).

The instrument comprised seven sections: 1) reproductive health knowledge, 2) drug abuse knowledge, 3) HIV/AIDS knowledge, 4) knowledge on age of marriage, 5) attitudes toward reproductive health, 6) sources of information, and 7) help-seeking behavior. Knowledge items were scored dichotomously (correct = 1, incorrect = 0), while attitudes were assessed on a five-point Likert scale. Reliability testing showed acceptable internal consistency, with

Cronbach's alpha values exceeding 0.70 across subscales.

Statistical analyses included descriptive statistics, Kruskal-Wallis tests, ANCOVA, and logistic regression to examine the differences in knowledge and attitudes across YICC membership and participation categories, adjusting for socio-demographic variables such as parental education, internet access, and residence. The Kruskal-Wallis test was employed due to the non-parametric nature of the data, as the distribution of knowledge and attitudes did not meet the assumptions of normality required for parametric tests. This test is appropriate for comparing more than two independent groups when the dependent variable is ordinal or continuous but not normally distributed (13,14).

RESULTS

The following table is a description of adolescents based on characteristics :

Table 1. Adolescent Characteristics

Variable	Frequency (n=830)	Percentage (%)
Sex		
Female	596	71.8
Male	234	28.2
Age Group		
< 15 years old	218	26.3
15-19 years old	529	62.7
> 20 years old	83	10
Residence		
Balikpapan	146	17.6
Samarinda	341	41.1
Berau	12	1.4
Bontang	92	11.1
West Kutai	42	5.1
East Kutai	35	4.2
Kutai Kartanegara	48	5.8
Mahakam Ulu	6	0.7
Paser	30	3.6
Penajam Paser Utara	78	9.4
Father's last education		
Elementary	108	13.0
Junior High School	106	12.8
Senior High School	381	45.9
College/ University	235	28.3
Mother's last education		
Elementary	143	17.2
Junior High School	123	14.8

Variable	Frequency (n=830)	Percentage (%)
Senior High School	346	41.7
College/ University	218	26.3
The existence of YICC		
Do not know	234	28.2
Know	596	71.8
Participate in YICC Activities		
Do not follow	513	61.8
Follow	317	38.2
YICC member		
Not being a member	652	78.6
Being a member	178	21.4

Table 1 presents the characteristics of the study participants, with 71.8% of them being female and the majority (62.7%) in the 15-19 age group. A significant portion of the sample (41.1%) resided in urban areas, particularly Samarinda. Although 71.8% of adolescents were aware of the existence of Youth Information and Counseling Centers (YICC),

only 38.2% had participated in YICC activities, and 21.4% were formal members. This discrepancy highlights a gap between awareness and active participation in the program, which may be attributed to insufficient promotion or lack of interest in YICC activities.

Table 2. Distribution of Adolescent Knowledge

No	Knowledge	Non-Member YICC (n=652)	YICC Member (n=178)	p value
Reproduction health				0,415
1	Male adolescents have entered puberty, which means that they could produce sperm.	640 (98.6)	173 (97.2)	0.0245*
2	Female adolescents who enter puberty could already produce ovum.	637 (97.7)	174 (97.8)	
3	Puberty in females is often 1-2 years earlier than in males.	613 (94)	169 (94.9)	
4	Generally, during puberty in adolescents, there is a rapid increase in height and weight.	635 (97.4)	175 (98.3)	
5	Having sex once between a male and a female could lead to pregnancy.	524 (80.4)	144 (80.9)	
Drugs Addiction				0.0245*
1	Using drugs will harm the physical and mental health of those who use them.	543 (83.3)	163 (91.6)	0.0025*
2	Nicotine in tobacco is a hazardous, addictive substance because it can kill brain cells.	618 (94.8)	170 (95.5)	
3	Physical dangers that arise from drug abuse include kidney failure, pneumonia, inflammation of the nerves, stomach damage, and death.	632 (96.9)	174 (98.3)	
4	Psychological dangers that occur as a result of drug abuse include excessive anxiety and extreme fear.	638 (97.9)	175 (98.3)	
5	Drug abuse could be prevented by staying away from relationships or friends who misbehaved.	633 (97.1)	172 (96.6)	
HIV/AIDS				0.0025*
1	AIDS is a collection of various symptoms of disease	611 (93.7)	169 (94.9)	

No	Knowledge	Non-Member YICC (n=652)	YICC Member (n=178)	p value
	due to the decline in the individual's immune system due to HIV.			
2	Weight loss (more than 10%) of baseline body weight and persistent fever (<37.5°C) for more than one month is one of the symptoms of HIV infection.	593 (91)	161 (90.4)	
3	HIV/AIDS is transmitted through unsafe sexual relations (multiple partners and not using condoms)	630 (96.6)	178 (100)	
4	Not having sex before marriage (pre-marital) is one way to prevent HIV/AIDS.	600 (92)	176 (98.9)	
5	HIV/AIDS is transmitted through unsterilized needles and infected with HIV.	597 (91.6)	171 (96.1)	
Age of Marriage				< 0.001*
1	The ideal age for marriage for women is 21 years.	444 (68.1)	102 (57.3)	
2	The ideal marriageable age for men is 25	577 (88.5)	173 (97.2)	
3	Early marriage will have an impact on the opportunity to get an education.	525 (80.5)	152 (85.4)	
4	Early marriage will have an impact on women's reproductive health.	536 (82.2)	159 (89.3)	
5	Getting married at an early age will have an impact on mental or psychological health.	575 (88.2)	158 (88.8)	

Table 2 presents a comparison of knowledge levels between YICC members and non-members in various reproductive health topics. Both groups demonstrated relatively high levels of knowledge regarding basic reproductive health concepts, such as puberty and the ability of adolescents to produce sperm and ovum, with minimal differences between them. However, significant disparities were observed in the areas of HIV/AIDS and the ideal age for marriage.

YICC members exhibited notably higher knowledge scores on topics related to HIV transmission, including its prevention through condom use and the risks associated with unsterilized needles. Specifically, 100% of YICC members correctly identified the transmission of HIV through unsafe sexual practices, compared to 96.6% of non-members. In addition, YICC participants showed superior awareness of the link between HIV/AIDS and early marriage prevention.

Regarding knowledge of marriage age, YICC members had a better understanding of the ideal marriageable age, particularly for women, with a significant difference in the

responses to this topic. A higher percentage of YICC members recognized the ideal age for marriage for both women (57.3%) and men (97.2%), compared to non-members, where only 68.1% and 88.5% respectively had similar knowledge. Interestingly, YICC members also showed significantly higher knowledge related to drug addiction, indicating that YICC participation may enhance broader health awareness beyond reproductive topic

These results indicate that participation in YICC activities contributes positively to enhancing adolescents' knowledge, particularly in more complex areas such as HIV prevention and marriage age awareness. The higher knowledge scores among YICC members suggest the effectiveness of peer-led education in improving adolescent reproductive health literacy.

Further information was obtained that the majority of adolescents (66.3%) were more comfortable telling stories about reproductive health or sexuality to their friends than to their mothers (54.3%), and 32.5% were comfortable telling stories to friends who were active in YICC.

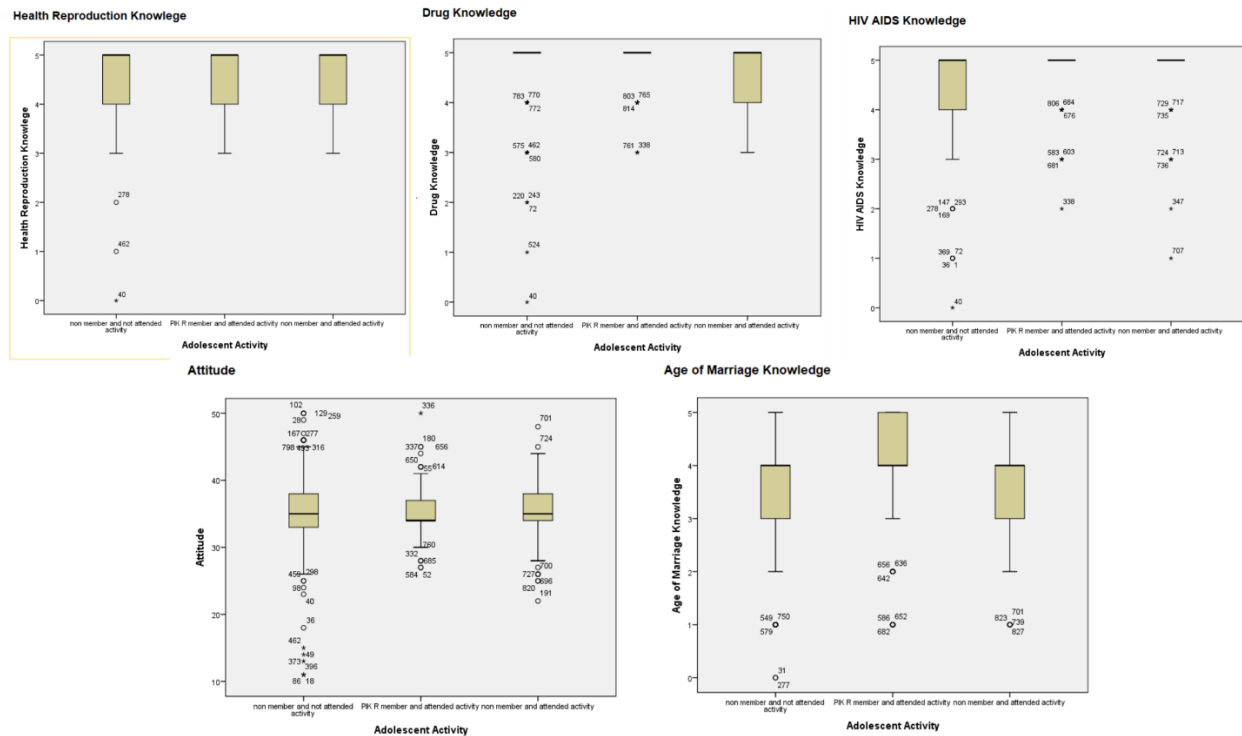


Figure 1. Box Plot distribution, the graph based on adolescent YICC members and activity (a) health reproduction, (b) drug addiction, (c) HIV/ AIDS, (d) age of marriage, and (e) attitude

Figure 1 shows the distribution of knowledge and attitudes of adolescents based on their three activities. The first quartile (Q1) and median (Q2) of health reproductive, drug addiction knowledge, and attitude from three group activities were similar. HIV/AIDS knowledge showed that the first quartile (Q1) of adolescents who were non-members of YICC and did not attend YICC activities differed from the other two groups of adolescents. Regarding knowledge of the age of marriage, adolescents who were members of and had participated in YICC both at school and in the community showed differences compared to the other two adolescent groups. Adolescents who were

members of and had participated in YICC at school and in the community also demonstrated a higher third quartile (Q3) in their knowledge of the age of marriage compared to those who had never attended YICC activities or were non-members of YICC.

Table 3 shows that the mean score for knowledge is above four (maximum 5), meaning that adolescents have known 90 percent of the knowledge. The lowest score was obtained from adolescents' knowledge about the age of marriage. Based on the attitude of adolescents, it is known that the average score is 35.16, with the highest score of 50.

Table 3. Differences in knowledge and attitude in adolescents with different activities

Knowledge	YICC Activity	Mean	Std. Deviation	Mean Rank	p value
HIV AIDS Knowledge	Non-member and not attended activity (n= 513)	4.63	0.736	401.72	0.008*
	Non-member and attended activity (n=139)	4.72	0.637	424.71	
	YICC member and attended activity (n=178)	4.80	0.510	448.03	
Age of Marriage Knowledge	Non-member and not attended activity (n= 513)	3.69	1.001	381.64	< 0.001 *
	Non-member and attended activity	3.78	1.034	406.84	

Knowledge	YICC Activity	Mean	Std. Deviation	Mean Rank	p value
Attitude	activity (n=139)				
	YICC member and attended activity (n=178)	4.18	1.079	519.86	
	Non-member and not attended activity (n= 513)	35.14	4.668	417.01	0.39
	Non-member and attended activity (n=139)	35.37	4.051	433.55	
	YICC member and attended activity (n=178)	35.06	3.248	397.07	

Table 4. Ancova result assessing the effect of YICC participation on adolescent knowledge and attitude, controlling for socio-demographic covariates.

Dependent Variable	F	df (between)	df (within)	p value	Partial Eta Squared
HIV/AIDS Knowledge	6.72	2	823	0.001	0.02
Marriage Knowledge	Age 8.94	2	823	<0.01	0.03
Reproductive Health Attitude	1.02	2	823	0.36	0.001

Multivariate analysis using ANCOVA was used to assess the effect of YICC participation on knowledge, controlling for demographic covariates. The results indicated a statistically significant main effect of YICC participation on HIV/AIDS knowledge scores, $F(2, 823) = 6.72$, $p = 0.001$, partial $\eta^2 = 0.02$. Adolescents who were active YICC members had significantly higher adjusted mean scores compared to those who had never attended YICC activities. Similarly, for knowledge regarding the ideal age of marriage, the effect of YICC participation remained significant after controlling for covariates, $F(2, 823) = 8.94$, $p < 0.001$, partial $\eta^2 = 0.03$.

The analysis of the data also examined the relationship between YICC participation and various reproductive health outcomes. This found that no significant main effect of YICC participation was observed on attitude scores related to reproductive health ($F(2, 823) = 1.02$, $p = 0.36$), suggesting that while the program positively influenced knowledge outcomes, shifts in attitudes may require longer-term or more intensive engagement.

Parental education and urban residence, as covariates, also had significant effects on both knowledge domains ($p < 0.05$), indicating that socioeconomic and geographic factors continue to play a role in shaping adolescents' health literacy.

Table 5. Regression Logistic Analysis of factors associated with adolescent knowledge of HIV/AIDS and Early Marriage Prevention

Independent Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p value
YICC Participation (Yes vs No)	1.9	1.30 – 2.70	0.001
Parental Education (High vs Low)	1.45	1.10 – 1.90	0.02
Internet Access (Yes vs No)	1.3	1.05 – 1.60	0.035
Gender (Female vs Male)	1.15	0.88 – 1.51	0.32
Age Group (15–19 vs <15)	1.25	1.00 – 1.56	0.048
Urban Residence (Yes vs No)	1.4	1.08 – 1.81	0.009

Participation in Youth Information and Counseling Centers (YICC) was found to be a significant predictor. Adolescents who participated in YICC activities were 1.9 times more likely to have higher knowledge compared to those who did not participate ($AOR = 1.90$; 95% CI: 1.30–2.70; $p = 0.001$). This underscores the strong influence of structured peer-led interventions on health knowledge outcomes.

Higher parental education was also associated with increased odds of adolescent knowledge ($AOR = 1.45$; $p = 0.020$), suggesting that home-based educational support remains an important determinant. Additionally, access to the internet showed a modest but statistically significant effect ($AOR = 1.30$; $p = 0.035$), reflecting the growing role of digital media in health information dissemination.

Age and urban residence were also significant. Adolescents aged 15–19 were more likely to have better knowledge compared to those under 15 years ($AOR = 1.25$; $p = 0.048$). Those residing in urban areas had higher odds of knowledge ($AOR = 1.40$; $p = 0.009$), potentially due to better access to information and services.

In contrast, gender was not a significant predictor in this model ($p = 0.320$), indicating that both male and female adolescents had similar levels of knowledge when controlling for other variables.

DISCUSSION

This study found that most adolescents, whether members or non-members of YICC, possess a solid understanding of reproductive health. However, YICC members exhibited superior knowledge, particularly regarding HIV/AIDS prevention and the legal age of marriage. The majority of adolescents (87.1%) access reproductive health information online, with 68.2% using social media for topics such as HIV prevention and drug addiction. Yet, only a small proportion receive reproductive health information from YICC's social media platforms.

The internet has become a predominant source for adolescents to seek health information, aligning with other study findings which noted the increasing effectiveness of social media over traditional media in influencing youth behaviors (15). While online

platforms offer advantages in health education, they also present risks, including exposure to misleading information, particularly on profit-driven platforms like Facebook and Instagram. Adolescents may face challenges such as understanding medical terminology and validating health content (16,17).

Peer educators at YICC could mitigate misinformation, as studies show that peer-led programs can be trusted more than educators who lack comprehensive knowledge in adolescent reproductive health (18). Peer educators, familiar with adolescent communication styles, are well-positioned to promote health awareness, especially considering that adolescents are more likely to discuss sensitive topics with peers rather than adults (19,20). Training peer educators has been shown to improve adolescents' knowledge and attitudes about sexuality (21).

YICC's social media also plays a significant role in disseminating accurate reproductive health information, and nearly half of the adolescents have accessed YICC's online content. This aligns with studies suggesting that media-based health campaigns can enhance knowledge on HIV/AIDS among adolescents (22,23). Social media also offers the advantage of facilitating peer-to-peer interaction and enabling youths to access information without time or spatial constraints (24).

The study also found significant differences in HIV/AIDS knowledge and marriage age awareness between YICC members and non-members. This highlights the importance of addressing early marriage, a critical risk factor for issues like stunting and maternal health risks. Early marriage, particularly among girls, is linked to higher health risks, including maternal complications and increased susceptibility to HIV (25–28). YICC's program has been crucial in providing adolescents with accurate information on these matters, contributing to positive shifts in their attitudes (29,30).

However, despite 71.8% of youth being aware of YICC, 61.8% have never participated in its activities. Increased youth engagement in YICC activities is necessary, as participation positively influences adolescents' behavior, knowledge, and attitudes (31,32). Low participation is attributed to insufficient awareness of YICC activities and lack of interest, emphasizing the need for better outreach and communication strategies (30).

The study's multivariate analysis confirmed the significant impact of YICC participation on adolescents' knowledge of HIV/AIDS and early marriage. YICC participants demonstrated significantly higher knowledge scores, with parental education and internet access being additional predictors. However, no significant differences were observed in attitude scores, suggesting that attitude changes may require more intensive interventions. These findings align with previous studies on the impact of youth-centred health programs (33,34).

CONCLUSIONS AND SUGGESTIONS

Conclusion

Most adolescents, regardless of their membership status in YICC, have a good level of reproductive health knowledge. Even though members of YICC have a better understanding of the prevention of HIV/AIDS and the age of marriage. Most adolescents access reproductive health information from the internet, but only a few of them get information related to reproductive health and sexuality from YICC's social media.

This study confirms that while most adolescents demonstrate good reproductive health knowledge, those who participate in Youth Information and Counselling Centre (YICC) activities exhibit significantly higher levels of knowledge, particularly concerning HIV/AIDS prevention and appropriate age of marriage. Multivariate analyses revealed that YICC participation remains a strong predictor of adolescent knowledge even after adjusting for key sociodemographic variables such as parental education (AOR = 1.90; 95% CI: 1.30–2.70; $p = 0.001$), internet access, and urban residence. These findings underscore the program's effectiveness in cognitive outcomes, though its impact on attitude formation remains limited.

Furthermore, digital platforms—especially the Internet and social media—are the predominant sources of reproductive health information. However, YICC's digital presence remains underutilized. While YICC's potential to influence adolescent health literacy is evident, its outreach and engagement must be expanded to translate knowledge gains into sustainable behavioral and attitudinal change. One limitation of this study is the reliance on

self-reported data, which may be subject to bias, and the cross-sectional design, which limits the ability to infer causality between YICC participation and health knowledge or behavior changes.

Suggestion

Enhancing YICC's effectiveness program, future programs should strengthen digital engagement through youth-friendly content and collaboration with schools and parents. Integrating YICC activities into formal education and peer-led initiatives can sustain knowledge improvement and gradually influence adolescent attitudes. Furthermore, outreach strategies should involve both parents and communities, ensuring inclusive access to digital resources, and fostering stronger collaboration between schools, health institutions, and local communities to promote sustained behavioral and attitudinal change among adolescents.

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AUTHOR CONTRIBUTIONS

IA: Responsible for the study, designed the research methodology, supervised data collection, and led the data analysis also contributed to writing the manuscript and revising the final draft. AN: Assisted in the design and implementation of the study, including data collection and analysis. She also contributed to interpreting the findings and revising the manuscript. ITP: Contributed to the conceptualisation of the study, provided input on the methodology, and assisted with data collection and interpretation of results. She also participated in drafting and reviewing the manuscript.

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