AN ANALYSIS OF TRENDS OF HIV CASES AMONG ADOLESCENTS IN PALOPO BETWEEN 2021 AND 2024

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ABSTRACT

Background: HIV cases among adolescents are a serious concern in Indonesia, including in Palopo, South Sulawesi. The transition from adolescence to early adulthood increases vulnerability to risky behaviors.
Objective: To analyze trends in HIV cases among adolescents (15–24 years old) in Palopo City during the 2021–2024 period, as well as the influencing factors from socio-cultural, medical, environmental, and educational perspectives.
Methods: This retrospective descriptive study used secondary data from the Palopo Health Office, HIV service facility reports, and the HIV/AIDS Information System (SIHA). Variables analyzed included the number of cases, gender, age, occupation, risk factors, health service unit (UPK), education, and clinical status. The analysis was conducted descriptively using tables, graphs, and interpretations based on literature from the past four years.
Results: The total number of adolescent cases increased from 13 (2021) to a peak of 64 (2023), then decreased to 36 (2024). The predominant age group was 18–23 years. Males had a higher proportion of cases than females, with heterosexual intercourse being the primary risk factor, followed by men who were sexually active. Most cases were detected at community health centers (Puskesmas), particularly in individuals with a high school education or equivalent, and asymptomatic HIV clinical status.
Conclusion: Case trends show a significant increase post-pandemic, indicating the need to strengthen early detection, comprehensive reproductive health education, youth-friendly services, and community-based cross-sector interventions.

Keywords: HIV, adolescents, epidemiological trends, Palopo.

1. Introduction

Adolescents are the age group most vulnerable to HIV/AIDS, where limited access to reproductive health services and high levels of risky behavior exacerbate this vulnerability. The 2024 UNAIDS report noted that 39 million people are living with HIV, with 1.3 million new infections occurring annually. Although global efforts have reduced new infections by 40% and AIDS-related deaths by 56% since 2010, cases among adolescents have shown an increasing trend. This situation poses a serious challenge to achieving the 2030 SDGs target of ending the AIDS epidemic as a health threat. Targeted interventions are needed through community empowerment, strengthening youth-friendly services, and comprehensive sexual and reproductive health education. (UNAIDS GLOBAL AIDS, 2025)

In Indonesia, the achievement of the global target of 95-95-95 by 2030 continues to be intensified through the expansion of HIV testing services as part of the Minimum Service Standards (SPM). (Joint United Nations Programme on HIV/AIDS (UNAIDS), 2025) In 2024, 6.9 million people (91% of the target) had been tested, with the finding of 63,707 PLHIV, of which 79.2% had already undergone ARV therapy. Cases dominated aged 25–49 years, but the increasing trend in adolescents (15–24 years) is of particular concern, related to the lack of sexual education, stigma towards VCT services, and limited access to accurate information. (Ministry of Health of the Republic of Indonesia, 2024)

In South Sulawesi Province, 197,148 HIV tests were conducted throughout 2024, with the finding of 2,120 people living with HIV. with HIV (PLHIV) , most of whom have started ARV therapy. (Ministry of Health of the Republic of Indonesia, 2024) In Palopo City, with a population of 190,867 people , HIV testing services are available at 9 community health centers and 5 referral hospitals. Data from the Palopo Health Office

shows an increase in the proportion of HIV cases in adolescents aged 15–24 years from 19.7% in 2021 to 43.5% in 2023 , although it decreased slightly in 2024, the figure remains higher than at the beginning of the observation period. (Palopo City Health Office, 2024) These findings confirm that adolescents still face high vulnerability, thus reinforcing the urgency of achieving the 2030 SDGs targets, particularly in eliminating AIDS as a public health threat through prevention strategies, early detection, and strengthening access to inclusive health services.

Previous research of HIV cases in Palopo showed that low levels of knowledge and attitudes among adolescents towards HIV/AIDS contributed to low levels of preventive behavior, with a significant relationship between levels of knowledge, attitudes, and preventive practices. (Asphina R. Djano & Ilmi, 2023) . These findings align with epidemiological trends showing an increasing proportion of cases in young age groups, thus emphasizing adolescents' vulnerability to infection and the urgent need for evidence-based interventions. Therefore, this study aims to analyze trends in HIV/AIDS cases among adolescents aged 15–24 years in Palopo for the period 2021–2024, by examining demographic distribution, risk factors, and influencing social, cultural, medical, and environmental aspects. This analysis is expected to provide a scientific basis for the formulation of more effective and sustainable intervention strategies, while supporting the achievement of the 2030 HIV/AIDS elimination target as set out in the Sustainable Development Goals (SDGs) agenda.

2. Literature Review

HIV is a virus that attacks the immune system and has the potential to develop into AIDS if left untreated, with transmission routes through risky sexual relations, shared use of needles, and mother-to-child transmission (UNAIDS, 2023) (WHO, 2021) . Globally, there will be 39 million people living with HIV in 2022, with 27% of new cases occurring in the 15–24 age group, indicating that adolescents are a vulnerable population (WHO, 2021) . In Indonesia, a similar trend has been seen with increasing cases among adolescents over the past five years due to limited comprehensive sexual education, the stigma of HIV testing, and the lack of youth-friendly health services. (Ministry of Health of the Republic of Indonesia, 2024)

At the local level, Palopo City showed a significant increase in HIV cases among adolescents, from 19.7% in 2021 to a peak in 2023, before declining slightly in 2024 (Palopo City Health Office, 2024) . Adolescent vulnerability is exacerbated by low sexual health literacy, high risk behaviors, and the influence of sociocultural factors and digitalization (UNAIDS, 2023) . Previous research confirms that unsafe sexual behavior and low early screening are key determinants of the increase in adolescent cases (Khalifa et al., 2023) , while a provincial report ranks Palopo as the region with the fastest-growing number of adolescent cases in South Sulawesi. These findings emphasize the importance of locally data-driven epidemiological studies as a basis for formulating intervention strategies.

Based on the theory of health determinants and a literature review, the increasing trend of HIV among adolescents is influenced by various interrelated factors. Individual factors include risky sexual behavior, condom use, and HIV knowledge. Social factors include family support, peer mentoring, and the influence of cultural norms. In terms of health services, the availability of access to VCT, youth-friendly services, and prevention programs in schools play a significant role in shaping preventive behavior. Furthermore, structural factors such as health policies, government programs, and the contributions of NGOs and communities are also significant determinants. This conceptual framework is used to interpret HIV trends among adolescents in Palopo City for the period 2021–2025,

so that the research results can serve as a basis for planning more effective, comprehensive, and sustainable health interventions.

3. Methodology

This study aims at examining trends in HIV cases among adolescents aged 15–24 in Palopo from January 2021 to December 2024, while also identifying recorded risk factors. This study deployed a retrospective descriptive research design. The study sites to collect the data include nine Community Health Centers and five hospitals providing HIV testing services during the year period. Data were obtained from annual health service reports of the Palopo Health Department Office, journals from service facilities, and HIV-AIDS Information System (SIHA). The data collection involved taking summary data HIV health services for ages 15–24, checking to avoid data duplication, and compiling data in tables based on gender, age group, occupation, education, risk factors, clinical status, and type of service facility. The proportion of positive cases was calculated against the number of tests (%) without conversion to figures per 100,000 population.

The main variables of this study include the number of HIV tests among adolescents per year, the number of positive cases per year, and the distribution of cases by gender, age group, facility type, and risk factors. Descriptive analysis was conducted using tables and graphs to illustrate trends in the number of tests, positive cases, and positivity rate during 2021–2024, as well as the distribution of cases by demographic variables and risk factors. Results are presented in percentages and diagrams, providing a visual overview of the dynamics of HIV cases among adolescents in Palopo City. This study used anonymized secondary data, with official approval from the Palopo Health Department Office for ethical considerations.

4. Results

Table 1 HIV Cases Based on Age Differences

YEAR	CASES BY AGE										TOTAL
	15	16	17	18	19	20	21	22	23	24	
2021	0	0	0	1	0	2	5	2	2	1	13
2022	1	2	1	3	3	7	4	5	8	3	37
2023	2	0	4	5	8	7	8	8	11	11	64
2024	0	0	6	10	4	3	4	4	2	3	36
AMOUNT	3	2	11	19	15	19	21	19	23	18	150

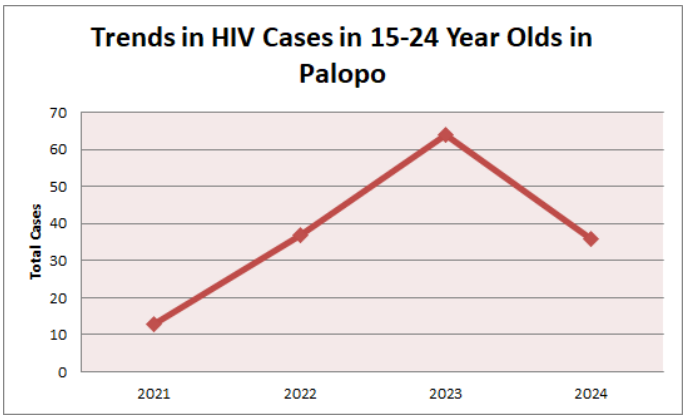


Figure 1. Graphic of HIV Cases Trend among Adolescents Aged 15-24 Years

- 2021: Relatively low cases (13 cases), likely due to the impact of the COVID-19 pandemic limiting testing.
- 2022: A significant spike to 37 cases, indicating increased testing coverage or increased transmission.
- 2023: Peak cases recorded (64 cases), which could be related to a combination of factors of increased reporting, testing awareness, and active transmission.
- 2024: There was a decrease to 36 cases, but it was still higher than in 2021, indicating that the epidemic problem was not over.

Table 1 illustrates the trend of HIV cases between 2021 and 2024 among adolescents aged between 15-24 years. It shows that there was a significant increase of HIV cases during the year period, accounting for 13 cases in 2021, increasing to 64 cases in 2023. However, HIV cases decreased to 36 cases in 2024. The surge in cases among the adolescents in 2023 indicates a shift in transmission patterns and risk groups that could be influenced by unhealthy sexual behavior, low condom use, limited access to reproductive health education, and socio-cultural determinants such as stigma and urbanization. These findings emphasize that HIV cases control strategies need to prioritize age-based interventions, particularly through comprehensive sexuality education, expanded access to HIV testing and ARV therapy services, and a cross-sectoral approach that is sensitive to local social and cultural contexts.

Table 2. HIV Cases Based on Sex Differences

Gender	TOTAL CASES				TOTAL	NUMBER OF CASES (15-24) YEARS				AMOUNT
	2021	2022	2023	2024		2021	2022	2023	2024	
Male	51	100	135	98	384	3	34	60	33	130
Female	15	12	13	14	54	10	3	4	3	20
AMOUNT	66	112	148	112	438	13	37	64	36	150

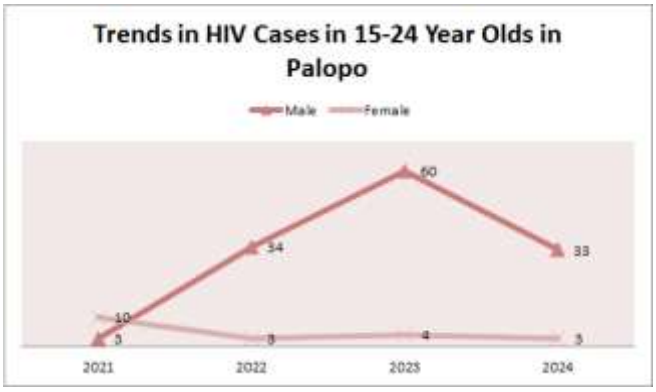
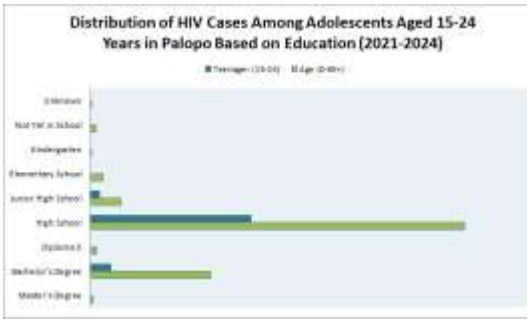


Figure 2. Trend in HIV Cases among adolescents aged 15-24 Year Based on Sex Differences

HIV cases among adolescents aged 15–24 in Palopo show a striking difference between men and women. Men experienced a sharp spike, from 3 cases in 2021 to 60 cases in 2023, before declining to 33 cases in 2024. In contrast, cases among women remained relatively low and stable, decreasing from 10 cases in 2021 to 3–4 cases in 2022–2024.

Table 2 and Figure 2 shows the Trend in HIV cases among the adolescents based on their sex differences. HIV trends among male adolescents underwent a sharp increase, with 3 HIV cases in 2021, rising to 60 cases in 2023, before declining to 33 cases in 2024. This significant increase appears to be linked to increased testing coverage, unhealthy sexual behaviour, and post-pandemic mobility. In contrast, cases among female adolescents remained relatively low and stable with 3–4 cases per year since 2022, although a peak of 10 cases was recorded in 2021. This trend was likely related to pregnancy screening. The male-to-female ratio reached 15:1 in 2023, reflecting risk disparities influenced by behavior, access to services, and social stigma. Sociocultural factors, limited reproductive health education, and urban environmental dynamics play a significant role in shaping this epidemic pattern.

Table 3. HIV Cases Based on Education

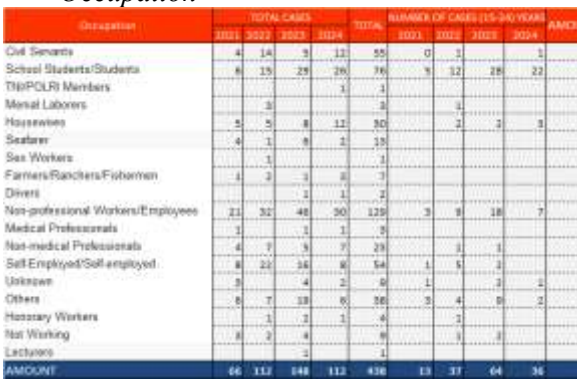


EDUCATION	TOTAL CASES				TOTAL	NUMBER OF CASES (15-24) YEARS				AMOU
	2021	2022	2023	2024		2021	2022	2023	2024	
Master's Degree	0	1	0	1	2	0	0	0	0	
Bachelor's Degree	17	31	26	21	95	5	2	6	3	
Diploma 3	4	0	0	1	5	0	0	0	0	
High School	36	71	111	78	296	7	35	55	30	1
Junior High School	4	6	9	5	24	1	0	3	3	
Elementary School	3	3	1	3	10	0	0	0	0	
Kindergarten		0	0	1	1	0	0	0	0	
Not Yet in School	2	0	1	1	4	0	0	0	0	
Unknown				1	1				0	
AMOUNT	66	112	148	112	438	13	37	64	36	1

Figure 3. Graph of the Number of HIV Patients in Adolescents (15-24 Years) Based on Education (2021-2024)

Table 3 describes HIV cases among adolescents aged 15 to 24 year based on their education. The table shows that distribution of HIV cases in Palopo is dominated by the group with a high school education (SMU), namely 127 cases accounting for 84.6% of the total cases, experiencing a peak in 2023 with 55 cases before declining in 2024 with 30 cases. The adolescents with undergraduate education ranks second with 16 cases, while those with junior high school education with 7 cases and other education are relatively small. These findings indicate that high school-level adolescents are the most vulnerable group, which can be attributed to the phase of identity discovery, risky relationships, low access to early HIV screening, and limited integration of reproductive health education in the school curriculum. Furthermore, environmental factors such as urbanization and the penetration of communication technology also expand the risk network, thereby reinforcing the urgency of school-based educational and prevention interventions.

Table 4. HIV Table Data Based on Occupation



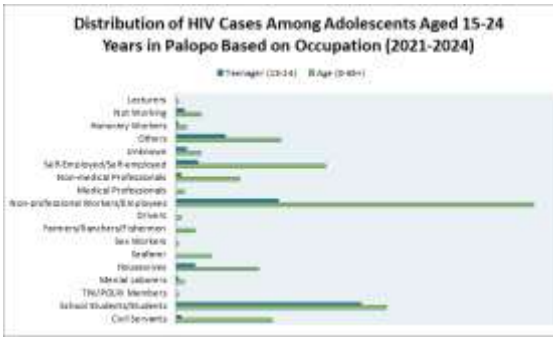


Figure 4. Graph of the Number of HIV Patients in Adolescents (15-24 Years) Based on Occupation (2021-2024)

Table 4 shows that between 2021 and 2024, 150 HIV cases were recorded among adolescents aged 15–24 in Palopo City, with the largest proportion among students (44.6%) and non-professional workers/employees (24.6%). The surge in cases among students, which peaked in 2023, indicates high vulnerability due to risky behaviour, social mobility, and limited access to comprehensive sexual education. Sociocultural factors such as stigma and taboos on sexuality, limited youth-friendly health services, and Palopo's urban environment, which encourages cross-regional interaction, exacerbate the dynamics of HIV transmission among young people.

Table 5. HIV Table Data Based on Risk Factors

Risk Factors	TOTAL CASES				TOTAL	NUMBER OF CASES (15-24) YEARS				AMOUNT
	2021	2022	2023	2024		2021	2022	2023	2024	
MSM	36	74	122	79	311	7	27	57	30	1
Risk Couples	9	12	11	10	42	1	2	3	2	
PS Clients	9	11	10	9	39	2	2	3	0	
Perinatal	2	1	1	2	6					
Blood Transfusion	1				1					
IDUs		2	2	1	5					
Transgender Women	4	9		3	16	1	4		2	
General Population				1	1					
PS				1	1					
FSW	5	1	1	2	9	2	1	1	1	
FSW TL		1			1					
PLHIV Partners			1		1					
Unknown		1		4	5		1		1	
AMOUNT	66	112	148	112	438	13	37	64	36	1

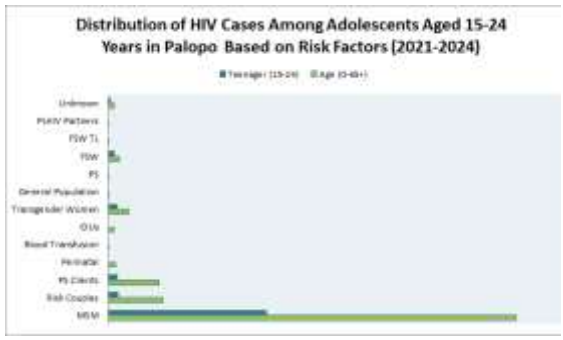


Figure 5. Graph of the Number of HIV Cases in Adolescents (15-24 Years) Based on Risk Factors (2021-2024)

Table 5 describes HIV cases for adolescents (15–24 years) based on risk factors in 2021–2024. Tha table shows that HIV risk factors among adolescents in Palopo are dominated by men who have sex with men (MSM), with 121 cases, followed by high-risk partners (8 cases), clients of sex workers (7 cases), and cases among transgender women (7 cases). However, there was no HIV cases due to perinatal transmission or blood transfusion. This findings confirms that the primary transmission among adolescents is concentrated in risky sexual behavior. Unlike adults, who have more diverse risk factors, cases among adolescents are relatively concentrated in communities with specific sexual interaction patterns. The high prevalence among MSM is inseparable from socio-cultural factors, such as stigma and taboos around discussing sexuality, which limit access to HIV prevention education. From a medical perspective, low utilization of VCT services and limited knowledge about the use of condom and PrEP use increase the risk of transmission. Meanwhile, environmental factors such as access to nightlife venues, undercover prostitution, and the use of social media and dating apps also increase the likelihood of unprotected sexual behavior among the adolescents.

Table 6. HIV Table Data Based on Health Service Units

Health Services Unit	TOTAL CASES				TOTAL	NUMBER OF CASES (15-24) YEARS				AMOUNT
	2021	2022	2023	2024		2021	2022	2023	2024	
Sawerigading Regional Hospital	46	41	25	20	132	5	5	6	6	
Doctor Pakerinnar Tandi Regional Hospital	1		7	7	15			3	3	
Bara Permai Community Health Center		1	2	1	4		1	2		
Benteng Community Health Center		11	35	18	34		5	23	6	
Mungkajang Community Health Center		4	2	3	9			1	1	
Pontap Community Health Center			3	4	7			1	1	
W. Padang Lambe Community Health Center				1	1					
Wara Barat Community Health Center		5	1	1	11		1	1		
Wara Community Health Center	6	11	8	9	34	1	8	7	6	
Wara Utara Community Health Center	2	22	16	5	45		12	30	3	
Wara Utara City Community Health Center			3	2	7			1	1	
Wara Selatan Community Health Center		3	2		5			1		
Maroangin Community Health Center			2		2					
At Medika General Hospital			5	1	6			2		
Bintang Laut General Hospital	10	10	14	21	55	1	3	5	6	
Megabuana General Hospital	1	1	3	5	12		1	1		
St. Madyang General Hospital		5	14	16	35		1	5	3	
Mujaiyah General Hospital				4	4				1	
AMOUNT	66	112	148	112	438	13	37	64	36	

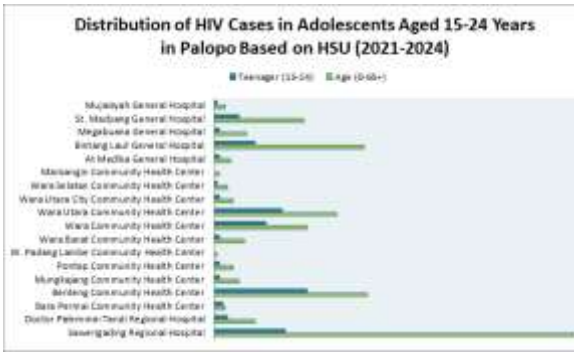


Figure 6. Graph of the Number of HIV in Adolescents (15-24 Years) Based on UPK (2021-2024)

Table 6 shows the distribution of HIV cases among adolescents aged 15–24 years based on the Health Service Unit (UPK) in Palopo between 2021 and 2024. The distribution of adolescent HIV cases based on Health Service Units (UPK) in Palopo showed quite striking variations. Benteng Community Health Center recorded the highest number of cases (34 cases), followed by Sawerigading Regional General Hospital (26 cases) and Wara Utara Community Health Center (25 cases), while other facilities such as Bintang Laut Hospital (15 cases) and St. Madyang Hospital (9 cases) were in the medium category. Several UPKs recorded very low, even zero, cases, such as Maroangin Community Health

Center, Wara Selatan Community Health Center, and Mujaisyah Community Health Center. Trendwise, cases were relatively stable in 2021–2022, then spiked sharply in 2023, especially at Benteng Community Health Center (+23 cases), and declined in 2024, except at Bintang Laut Hospital, where HIV cases increased. This pattern indicates the influence of screening intensification, differences in service capacity, and variations in health-seeking behavior across regions. Socio-cultural factors such as stigma, adolescent mobility, and the proximity of UPKs to activity centers also influence case distribution. From a medical perspective, laboratory capacity, VCT availability, and quality of record-keeping contribute to differences in case numbers. Meanwhile, environmental and educational factors — such as the location of UPKs in high-risk areas and low levels of reproductive health education in schools — are also important determinants affecting HIV detection and transmission among adolescents.

Table 7. IV Data Table for Adolescents Based on Marital Status

Status	TOTAL CASES				TOTAL	NUMBER OF CASES (15-24) YEARS				AMOU
	2021	2022	2023	2024		2021	2022	2023	2024	
Married	17	19	22	21	79	1	2	3	2	
Unmarried	41	87	124	79	331	11	34	61	33	
Married				2	2					
Widower		2		1	3					
Widowed	3	3	2	2	10				1	
Divorced				1	1					
Divorce Life				2	2					
Divorce Dead				1	1					
Mental Health	3				3					
Don't know	2	1		3	6	1	1			
AMOUNT	66	112	148	112	438	13	37	64	36	

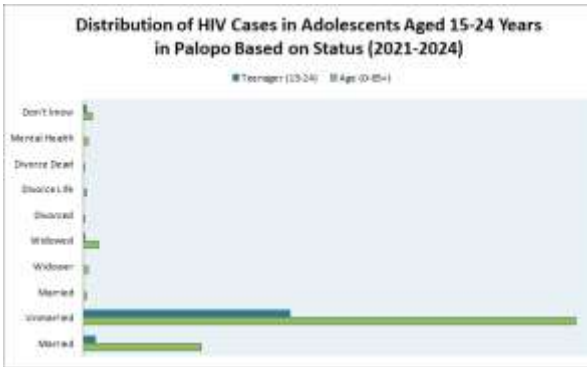


Figure 7. Graph of the Number of HIV in Adolescents (15-24 Years) Based on Status (2021-2024)

Table 7 illustrates trends in HIV cases among adolescents aged 15–24 year based on their marital status. The table shows that unmarried adolescents had the highest number of cases and experienced a significant increase from 2021 (11 cases) to a peak in 2023 (61 cases). However, HIV cases among the unmarried adolescents decreased in 2024 (33 cases). In contrast, married had a relatively low and stable number of cases, with small fluctuations from 2021 to 2024 (1–3 cases per year).The surge in HIV cases was primarily influenced by risk factors for men who are sexually active (MSM) and high-risk heterosexual relationships, with a concentration among students and non-professional workers. Sociocultural factors such as adolescent social norms, the influence of digital media, stigma, and urbanization also increased the likelihood of exposure, while limited youth-friendly services and low voluntary HIV testing coverage posed medical barriers. Cases were predominantly found among high school graduates, indicating a lack of HIV education in formal education, and were concentrated in large community health centers (UPK) in densely populated areas.

Table 8. HIV Data Table for Adolescents Based on HIV/AIDS Cases

Case	TOTAL CASES				TOTAL	NUMBER OF CASES (15-24) YEARS				AMOUNT
	2021	2022	2023	2024		2021	2022	2023	2024	
HIV	7	40	65	45	157	2	20	32	20	74
AIDS	59	71	83	67	280	11	16	32	16	75
AMOUNT	66	111	148	112	437	13	36	64	36	149

During the 2021–2024 period, HIV and AIDS cases among adolescents in Palopo showed a sharp upward trend, peaking in 2023 (HIV: 32 cases; AIDS: 32 cases), then declining in 2024, although remaining higher than at the beginning of the period. This spike reflects both increased early

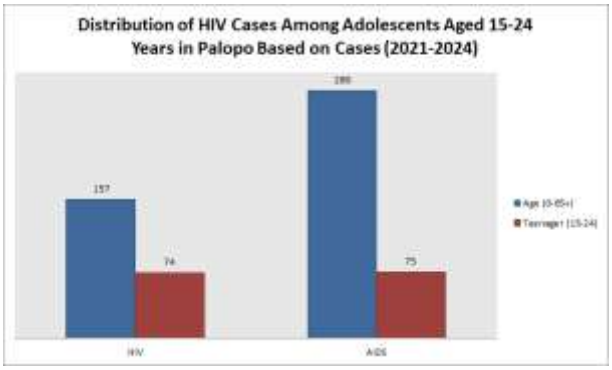


Figure 8. Graph of the Number of HIV Cases in Adolescents (15-24 Years) Based on Cases (2021-2024)

detection and delayed diagnosis, as evidenced by the persistently high number of AIDS cases. Sociocultural factors such as stigma, urbanization, and risky sexual behavior contribute to the spread of cases, while medical factors related to low utilization of HIV testing, delayed diagnosis, and adherence to treatment are also contributing factors.

ARV therapy also worsens the condition. Furthermore, environmental factors such as population density and high mobility increase the risk of transmission, while limited reproductive health education in high schools leaves adolescents lacking adequate prevention knowledge.

5. Discussion

HIV trends among adolescents aged 15–24 in Palopo from 2021 to 2024 demonstrate dynamics influenced by social and cultural factors, as well as post-pandemic behavioral changes. As an urban area with rapid socioeconomic development, Palopo strongly adheres to local cultural norms, yet at the same time, adolescents are increasingly exposed to the influence of digital media and cross-regional interactions. This creates a clash between traditional social values and the reality of risky behaviour among adolescents.

Data shows a sharp increase in HIV cases among adolescents in 2021–2023, which may be linked to the post-COVID-19 pandemic impact. During the pandemic, many adolescents went undetected due to limited screening services, leading to a resurgence in cases after in-person testing. Furthermore, the return to in-person social activities increased the likelihood of risky behaviours. A decline in cases in 2024 is expected due to the expansion of HIV testing services, ART, the Ministry of Health's VCT clinics and adolescent health services, and the strengthening of the role of peer support communities.

This pattern is in line with Green's theory of health behaviour which emphasizes the role of predisposing factors (knowledge, attitudes), enabling factors (access to services), and reinforcing factors (social support) in shaping health behaviour. (Firdaus et al., 2023) . Furthermore, the demographic bonus, predicted to peak in 2030, adds to the urgency of addressing this issue. The increasing proportion of productive age groups (15–64 years old) can be an opportunity if managed through increased competency and skills, but it has the potential to create social problems, including risky adolescent behaviour, if not properly addressed. Therefore, strengthening education, access to services, and social support are key to minimizing HIV risk among adolescents. (Achmad Nur Sutikno, 2020) .

The situation of adolescents in Palopo demonstrates a complex interaction between socio-cultural, medical, environmental, and educational factors influencing HIV/AIDS trends. From a socio-cultural perspective, family values and social control can potentially be a preventative measure, but taboos surrounding sexuality, stigma against men who have sex with HIV/AIDS, and discomfort with discussing sexual issues could hinder educational opportunities. Furthermore, socio-economic status exacerbates vulnerability, with adolescents from low-income families having limited access to health services, including

VCT and youth-friendly services, as explained in the theory of *structural vulnerability* (Mozin et al., 2024).

From a medical perspective, although HIV testing services are available at community health centers and hospitals, the limited availability of youth-friendly services (e.g., confidentiality, flexible hours, and trained personnel means that most adolescents only access services at an advanced stage. This barrier is compounded by social stigma, delaying early detection. The urban environment of Palopo— with schools, boarding houses, economic centers, and entertainment centers serving as interaction spaces — is a key focal point for the formation of risky behaviours, consistent with *the life course perspective*, which emphasizes adolescence as a critical transitional phase toward independence.

Education is a key determinant, with the high number of cases among junior high school and senior high school students highlighting the need for comprehensive sexuality education (CSE) covering topics such as sexual consent, STIs, PrEP/PEP, and access to guidance and counseling. Unfortunately, health literacy among adolescents in Palopo remains low, leaving them vulnerable to exposure to misleading information through digital media. A meta-analysis shows that adolescents with low literacy are twice as likely to engage in risky sexual behavior. (Yusha Tao,a,b,w Margaret Byrne,c,w Dorian Ho,d,w Zixuan Zhu,a, 2024) . Therefore, prevention strategies must be multidimensional — combining comprehensive sexual education, condom distribution, expansion of youth-friendly services, and peer empowerment — and designed to be sensitive to local cultures. This is in line with Erikson's theoretical framework. (Rizki, 2024) , which emphasizes the importance of intervention not only in individuals, but also families, schools, and communities.

This study has several limitations that should be considered when interpreting the results. First, the data used were sourced from secondary reports, so there may be small or "unknown" categories that risk *under-ascertainment*. Second, some changes in HIV case trends may reflect increased detection due to expanded health services (supply-side) rather than actual changes in adolescent behaviour (demand-side). Third, not all important variables, such as the number of HIV tests per year or PrEP use, were fully available, limiting the analysis to key indicators. Furthermore, the adolescent-specific positivity rate was not calculated in detail because the study focused on accelerating descriptive analysis.

The research findings emphasize the need for more targeted interventions for adolescents, particularly young men and men who are sexually active (MSM), through regular HIV testing, condom and lubricant distribution, self-testing, and access to PEP/PrEP in stigma-free health facilities. Comprehensive sexuality education (CSE) should be strengthened in high schools, vocational schools, and universities through collaboration between the Health Office, the Education Office, and Community Health Center, with the support of *peer educators* and local digital channels. Optimizing services in Community Health Center hotspots ” such as Benteng Community Health Centers, North Wara, Wara, and Sawerigading Regional General Hospital (RSUD) and Madyang Hospital is crucial by opening youth-friendly clinics, expanding service hours, and ensuring *fast-track linkage* to ARVs with *same-day ART*. A community-based approach through *outreach* in schools, boarding houses, and youth activity centers aligns with the UNAIDS “Let Communities Lead” strategy, while separate quarterly HIV and AIDS monitoring will help assess the effectiveness of early detection and target a reduction in the proportion of AIDS in adolescents to ≥50% within 12–18 months. In addition, improving the quality of risk factor recording is necessary to generate more precise responses.

6. Conclusion

This study demonstrates that HIV cases among adolescents aged 15–24 in Palopo increased substantially between 2021 and 2023, followed by a decline in 2024, although the numbers remained higher than at the beginning of the study period. Most cases occurred among adolescents aged 18–23, particularly males, with heterosexual intercourse and men who have sex with men (MSM) identified as the primary risk factors. Most cases were detected during the asymptomatic phase of HIV; however, advanced AIDS cases were still observed, especially in referral facilities. These findings indicate that the HIV epidemic among adolescents is influenced by a combination of individual, social, and cultural factors, alongside limitations in health services.

To deepen understanding, future research should combine longitudinal and qualitative approaches to explore adolescent behavior, stigma, and the effectiveness of youth-friendly services. More detailed risk factor analyses and primary data-driven evaluations are essential for more precise policymaking. For the local government, these findings imply the need to strengthen comprehensive interventions: expanding youth-friendly VCT services in UPK and schools, strengthening peer-educated Comprehensive Sexuality Education (CSE), developing local digital channels for education and counseling, and normalizing public discourse on HIV through community-based anti-stigma campaigns. Furthermore, separate quarterly monitoring and evaluation of HIV and AIDS will help assess the effectiveness of early detection. Implementing this strategy will support the achievement of the 2030 SDGs, particularly HIV/AIDS elimination, by making Palopo's youth both central and agents of change.

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