

Analysis of HIV Case Dynamics in Boyolali District, Central Java Province, 2021-2023

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ABSTRACT

HIV (Human Immunodeficiency Virus) is a virus that attacks the immune system which plays an important role in protecting the body from infection. If not treated, HIV infection will develop into AIDS (Acquired Immunodeficiency Syndrome), HIV/AIDS is still a significant public health problem in Indonesia, including in Boyolali District. In the last three years, HIV cases in this region have shown a fluctuating trend with the number of new cases continuing to be reported each year. This study aims to analyze the dynamics of HIV cases in Boyolali District in the last three years and identify the most vulnerable groups to support more effective prevention and treatment programs. This study used descriptive analysis methods with secondary data obtained from the Boyolali District Health Office analyzed using Microsoft Excel. In 2023, 206 new HIV cases were found, which increased compared to 125 cases in 2022 and 82 cases in 2021. A total of 94.5% occurred in productive age >20 years, with a proportion of men of 64.9% with 3 deaths in 2021. As many as 1.4% of HIV positive cases were found at the age of 0-4 years which occurred due to transmission from mother to child. The biggest risk factor comes from men who have sex with men (MSM) with the type of work from the private sector. The Boyolali district government has increased Voluntary Counseling and Testing (VCT) services and expanded education to vulnerable groups, including school students. However, there is still a need to increase prevention that is more focused on vulnerable groups in areas with the highest case finding.

Keywords: Human Immunodeficiency Virus (HIV), Acquired Immune Deficiency Syndrome (AIDS), Epidemiology, Boyolali District.

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Introduction

Human Immunodeficiency Virus (HIV) continues to be a major challenge to global public health, including in Indonesia, where HIV/AIDS remains a significant problem. Every day new cases of HIV/AIDS occur and the number is always increasing. The highest distribution of HIV/AIDS cases occurred in the age group of 20-29 years (32.1%), the age group of 30-39 years (31%), 40-49 years (13.6%), 50-59 years (5.1%), and 15-19 years (3.2%). Based on sex, the percentage of HIV/AIDS in men is 58% and 33% for women. Meanwhile 9% did not report gender. Central Java Province is the region that currently has

the fifth highest cumulative number of HIV/AIDS in Indonesia. Over the past three years there has been a significant increase in new cases. Since it was first discovered in Central Java until 2018 there have been 23,603 cases, 1,672 of whom died of AIDS [1]. HIV will attack the immune system resulting in AIDS. The number of cases of HIV infection is increasing from year to year. Indonesia is one of the countries in Southeast Asia that has a high number of HIV cases. In Indonesia, approximately 540,000 people are living with HIV infection. The number of new HIV infections was around 21,511 in 2012 and increased to 41,250 in 2016. However, the

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number of new HIV infections has decreased to approximately 25,000–28,000 in 2021. HIV transmission rates vary over time, but sexual transmission is currently the most prevalent in Indonesia at 89%. HIV has a special affinity for CD4 cells where HIV will attack and disrupt the delicate balance and eventually cause various complications, especially in advanced HIV patients. The number of CD4 cells depends on age, gender, and the condition of a person’s immunity [2,3].

In Boyolali District, HIV cases have shown a fluctuating trend in the last three years, reflecting the ongoing challenges in prevention, detection, and treatment. The majority of cases occur in the productive age group, which has a significant impact on the social and economic aspects of the community. Factors such as risky sexual behavior, including men who have sex with men (MSM), as well as mother-to-child transmission, contribute to the continuation of new cases. This emphasizes the importance of targeted interventions and improved access to diagnostic and treatment services. Although the Boyolali District Health Office has expanded Voluntary Counseling and Testing (VCT) services and community education, there are still shortcomings in effectively reaching high-risk populations. Analysis of HIV epidemiologic trends in Boyolali District is critical to develop more appropriate strategies to address the epidemic and protect vulnerable groups. This study analyzes the epidemiological dynamics of HIV cases in Boyolali District over the past three years (2021-2023). The study aims to describe trends in the number of cases, demographic characteristics such as age and gender, and identify key risk factors associated with HIV transmission. It also focuses on clustering vulnerable populations, such as the productive age group and children experiencing vertical transmission, to provide relevant information to support more effective HIV prevention and treatment programs. With this approach, the results of the study are expected to provide a basis for more targeted and evidence-based decision-making and public health policy development at the local level.

Method

This study uses descriptive analytical methods to analyze the dynamics of HIV cases in Boyolali District over the past three years. The data used were secondary data obtained from the Boyolali District Health Office, including the number of cases, demographic characteristics, and key risk factors associated with HIV transmission. The collected data were analyzed using Microsoft Excel for descriptive statistical analysis and data visualization through graphs and tables.

Result

The total number of HIV/AIDS cases from 2016 to 2021 is 507 patients with the discovery of new HIV/AIDS cases in the year. 2021 as many as 82 sufferers. Of the 82 HIV / AIDS sufferers, 19 sufferers are already at the AIDS stage and 3 sufferers are declared dead. in 2022 125 new HIV cases were found while there was an increase in case finding, namely 206 new HIV cases.

Based on the graphs and tables provided, the trend of HIV/AIDS cases in Boyolali District from 2021 to 2023 shows an increasing pattern in several puskesmas working areas. Boyolali

1 had the highest number of cases for three consecutive years with a significant increase from 39 cases in 2021, to 69 cases in 2022, and 84 cases in 2023. This was followed by Boyolali 2, which also showed an increase from 17 cases in 2021 to 25 cases in 2022 and 34 cases in 2023. Some other areas, such as Simo, showed a steady increase from 7 cases in 2021 to 14 cases in 2023. However, areas such as Juwangi saw a decrease in cases from 2 in 2022 to 0 in 2023. Meanwhile, health centers in other areas such as Mojosongo, Sawit, and Ngemplak reported only a few cases over the three years.

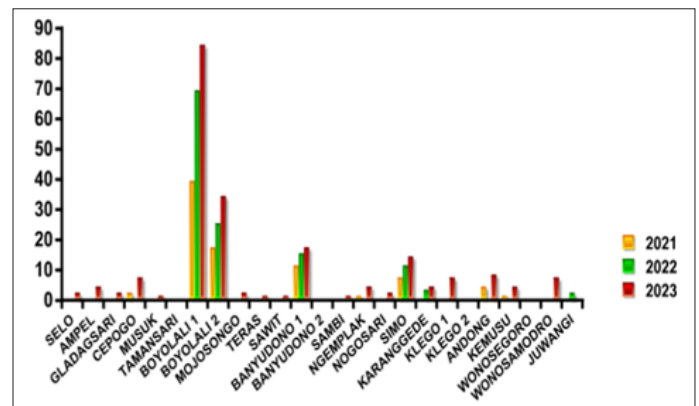


Figure 1: Trends in HIV/AIDS disease 2021-2023

Health centers with the highest number of cases, such as Boyolali 1 and Boyolali 2, require more attention to strengthen prevention and treatment programs. Declining cases in some areas, such as Juwangi, could also be an indicator of successful public health interventions or challenges in case reporting. Overall, this data highlights the need to strengthen early detection and reduce stigma in accessing health services.

Table 1: New Case Finding by Gender

	2021	2022	2023	Percentage (%)
Male	56	64	145	64,2
Female	26	61	61	35,8

The distribution of HIV/AIDS cases by gender shows an interesting pattern over the 2021-2023 period. The following year, there was an increase in the number of cases in women to 61, while cases in men increased more moderately to 64. However, a significant spike was seen in 2023, where cases in men jumped dramatically to 145, while cases in women remained stagnant at 61. This trend indicates that men are becoming a progressively more affected population, especially in 2023.

Table 2: New Case Finding by Age Group

	2021	2022	2023	Percentage (%)
≤ 4 Years	3	1	2	1,5
5 - 14 Years	0	0	5	1,2
15 - 19 Years	3	9	5	4,1
20 - 24 Years	5	19	35	14,3
25 - 49 Years	56	76	128	63
≥ 50 Years	15	20	31	15,9

HIV case finding data in Boyolali district shows significant variation by age group over the period 2021 to 2023. In the ≤ 4 years age group, the number of cases detected was 3 cases in 2021, decreased to 1 case in 2022, and increased again to 2 cases in 2023. The 5-14 years age group had no reported HIV cases in 2021 and 2022, but 5 cases were recorded in 2023. In the 15-19 age group, there were 3 cases in 2021, 9 cases in 2022, and a decrease to 5 cases in 2023. The 20-24 age group showed a significant increase in cases, with 5 cases in 2021, 19 cases in 2022, and 35 cases in 2023. The 25-49 age group recorded the highest number of cases, with 58 cases in 2021, 76 cases in 2022, and 128 cases in 2023. Meanwhile, the age group ≥ 50 years experienced a more moderate increase in cases, with 16 cases in 2021, 20 cases in 2022, and 31 cases in 2023. Of the 125 new HIV cases found in 2022, 120 people (96%) had received ARV treatment, and in 2023 of the 206 new cases found, 107 people had received ARV treatment (51.9%). Most new ODHIV were found in Boyolali sub-district, which is an urban area in Boyolali district.

Based on the reported data, the highest number of people living with HIV/AIDS (PLWHA) in Boyolali District came from private sector workers, with 294 people, followed by the “other” job category with 119 people. HIV cases are also distributed across other professions, including laborers, students, State Civil Apparatus (ASN), police, state-owned enterprises, health workers, self-employed, commercial sex workers, salon or tattoo workers, drivers, masseurs, fishermen or sailors, teachers, prisoners, tailors, and buskers. This variation shows that PLHIV come from various occupational sectors, although the private sector is dominated. In addition, the greatest risk factor for HIV transmission in Boyolali District was found among men who have sex with men (MSM).

Discussion

New HIV case-finding in Boyolali District over the 2021-2023 period shows a significant increase, especially in productive age groups and men, which is consistent with global trends. Previous studies have also noted that HIV tends to be more common in the productive age group due to high-risk sexual behaviors and lack of awareness of regular self-examination [4-6]. The sharp increase in male cases in Boyolali District may reflect the increasing prevalence of risky sexual behaviors, including in the MSM population, which is often under-reached by conventional prevention programs [7-9]. Some studies have shown that community-based programs that utilize digital technologies, such as apps for HIV education and counseling, can increase intervention coverage among this group [10-13]. In addition, despite the expansion of the VCT program, the low percentage of patients initiating ARV therapy (51.9% by 2023) suggests barriers to access and continuation of treatment. Other studies have also revealed that social stigma and discrimination at health facilities are significant barriers to HIV services [14-16]. Strategies such as training health workers on non-discrimination and providing community-based services can help address these issues [17-19].

The geographic distribution of cases shows a high concentration in the urban area of Boyolali, which may be due to higher levels of mobility and population density. These areas require focused

interventions, including the strengthening of community-based prevention campaigns [20,21]. Global studies support the importance of geographic approaches in mapping HIV risk and designing local intervention strategies [22]. Despite improvements in VCT coverage and community awareness, these results suggest the need for more adaptive strategies to reach vulnerable populations and reduce stigma. Improvements in case recording and reporting systems will also support future epidemiologic efforts.

The high proportion of private sector workers may be due to their high mobility and potential engagement in risky behaviors, such as unprotected sexual intercourse or injecting drug use [23]. In addition, the largest risk factor in this region was male sex workers (MSM), reflecting a similar trend to global HIV epidemiology data, where key populations such as MSM have higher vulnerability to HIV infection than the general population [24]. These findings highlight the importance of prevention approaches tailored to the demographic and behavioral characteristics of these professional groups and key populations. Strategies such as workplace-based education, counseling, and strengthening Voluntary Counseling and Testing (VCT) programs can increase awareness and access to HIV prevention and treatment services. Approaches that focus on key populations, including MSM, should also be optimized through community-based education and campaigns that reduce stigma against these vulnerable groups.

This study has several limitations, including the use of secondary data from the Boyolali District Health Office, which may not be fully complete or accurate due to underreporting and social stigma. In addition, the limited scope of the study in a particular area reduces the generalizability of the results to populations with different characteristics. Reliance on diagnostic and reporting systems risks underdiagnosis, especially in areas with minimal health resources. This study also did not include qualitative data such as in-depth interviews that could have explored social and psychological factors, and has not quantitatively evaluated the impact of interventions. An in-depth analysis of specific risk factors was also not conducted. Therefore, future research is recommended to integrate primary data, measure program effectiveness, and expand population coverage to produce more comprehensive and representative findings.

Conclusion

Local government efforts to expand Voluntary Counseling and Testing (VCT) services and improve community education have had a positive impact, but have not been sufficient to optimally reach vulnerable populations. Geographical distribution shows a concentration of cases in certain areas that require more focused interventions. More adaptive prevention strategies are needed, including improved access to health services, strengthened education programs, and community empowerment to reduce stigma towards key populations. These recommendations are expected to support efforts to achieve the 95-95-95 global targets for HIV control.

Author's Note

All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this article,

take responsibility for the integrity of the work as a whole, and have given their approval for this version to be published.

Data Availability Statement

Publicly available datasets were analyzed in this study. This data can be found here:

<https://dinkes.bojolali.go.id/profile#>

Author Contributions

Data collection, drafting, data analysis, validation and visualization. TTK and RAA: supervision and drafting and editing. All authors contributed to the article and approved the submitted version.

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Supplementary Material

The Supplementary Material for this article can be found online at:

Reference

1. Director General of P2PL (2018) Ministry of Health. Statistics on HIV / AIDS Cases in Indonesia Trimester IV of 2018. Jakarta: Ministry of Health of the Republic of Indonesia.
2. Azinar M, Nisa A, Furqonawati F (2020) Perception of HIV/AIDS Risk Behavior among Students in Central Java Indonesia. Proceedings of the 5th International Seminar of Public Health and Education, ISPHE 2020, 22 July 2020, Universitas Negeri Semarang, Semarang, Indonesia.
3. Jocelyn, Nasution FM, Nasution NA, Asshiddiqi MH, Kimura NH, et al. (2024) HIV/AIDS in Indonesia: current treatment landscape, future therapeutic horizons, and herbal approaches. *Front Public Heal* 12: 1–11.
4. UNAIDS (2023) Global HIV & AIDS statistics—fact sheet. Geneva: UNAIDS.
5. Joint United Nations Programme on HIV/AIDS (UNAIDS) (2017) Ending AIDS: progress towards the 90–90–90 targets. Geneva: UNAIDS.
6. Kuller LH (2021) Epidemiology and the prevention of HIV/AIDS. *Public Health Rev* 42: 160–20.
7. Beyrer C, Baral SD, van Griensven F, Goodreau SM, Chariyalertsak S, et al. (2012) Global epidemiology of HIV infection in MSM. *Lancet* 380: 367–77.
8. Baral SD, Poteat T, Strömdahl S, Wirtz AL, Guadamuz TE, et al. (2013) Worldwide burden of HIV in transgender women: a systematic review and meta-analysis. *Lancet Infect Dis* 13: 214–222.
9. Operario D, Gamarel KE (2019) Sexual minority health disparities in adult men and women. *Annu Rev Clin Psychol* 15: 395–419.
10. Holloway IW, Winder TJ, Lea CH, Tan D, Boyd D, et al. (2017) Technology Use and Preferences for Mobile Phone-Based HIV Prevention and Treatment Among Black Young Men Who Have Sex with Men: Exploratory Research. *JMIR Mhealth Uhealth* 5: 46e.
11. Haberer JE, Sabin L, Amico KR, Orrell C, Galárraga O, et al. (2017) Improving antiretroviral therapy adherence in resource-limited settings at scale: a discussion of interventions and recommendations. *J Int AIDS Soc* 20: 21371.
12. Gamarel KE, Nelson KM (2021) Impact of social media on HIV/AIDS prevention. *Curr Opin HIV AIDS* 16: 390–395.
13. Rao D, Elshafei A, Nguyen M (2019) Stigma and HIV-related health disparities. *AIDS Behav* 23: 1246–1259.
14. Turan B, Budhwani H, Fazeli PL, Browning WR, Raper JL, et al. (2017) How Does Stigma Affect People Living with HIV? The Mediating Roles of Internalized and Anticipated HIV Stigma in the Effects of Perceived Community Stigma on Health and Psychosocial Outcomes. *AIDS Behav* 21: 283–291.
15. Smit PJ, Brady M, Carter M, Fernandes R, Lamore L, et al. (2012) HIV-related stigma within communities of gay men: A literature review. *AIDS Care* 24: 405–412.
16. Nyblade L, Stockton MA, Giger K (2017) Stigma and discrimination as barriers to HIV testing and prevention. *Lancet HIV* 4: e460–8.
17. Thornicroft G, Brohan E, Kassam A, Lewis-Holmes E (2008) Reducing stigma and discrimination: Candidate interventions. *Int J Ment Health Syst* 2: 3.
18. Rueda S, Mitra S, Chen S, Gogolishvili D, Globerman J, et al. (2016) Examining the associations between HIV-related stigma and health outcomes in people living with HIV/AIDS: a series of meta-analyses. *BMJ Open* 6: e011453.
19. Mahajan AP, Sayles JN, Patel VA, Remien RH, Ortiz D, et al. (2008) Stigma in the HIV/AIDS epidemic: A review of the literature and recommendations for the way forward. *AIDS* 22: S67–79.
20. Abara W, Hess KL, Farel CE (2016) Geography and HIV disparities. *J Public Health Manag Pract* 22: S15–23.
21. Tanser F, de Oliveira T, Maheu-Giroux M (2014) Spatial clustering of HIV infections. *Nature* 505: 98–103.
22. Weiss RA (1993) How does HIV cause AIDS? *Science* 260: 1273–9.
23. Maheu-Giroux M, Tanser F (2019) Mapping HIV risk. *Lancet HIV* 6: e479–88.
24. UNAIDS (2023) Global HIV/AIDS epidemic data. Geneva: UNAIDS.

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