

Tracking Progress Toward Tuberculosis Elimination in West Java (2017–2025)

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Abstract

Tuberculosis (TB) is a chronic infectious disease that remains a major global public health challenge caused by the bacterium *Mycobacterium tuberculosis*. This study aimed to analyze temporal trends in tuberculosis incidence rates (IR) and case fatality rates (CFR), as well as evaluate tuberculosis control strategies in West Java. This study employed an analytical descriptive method with a retrospective cohort study design. The temporal trend analysis showed that tuberculosis cases in West Java from 2017 to 2025 continued to increase significantly, accompanied by a rise in CFR. The tuberculosis elimination program in West Java has not yet achieved optimal effectiveness and continues to face various challenges. Therefore, improvements are needed through comprehensive epidemiological analysis, equitable access to quality healthcare services, strengthened early detection efforts, sustained cross-sectoral collaboration, and health education initiatives to increase public awareness and encourage the adoption of Clean and Healthy Living Behaviors (PHBS) to reduce tuberculosis transmission. The tuberculosis elimination program in West Java has not yet reached its expected targets, as indicated by the persistent increase in TB incidence and case fatality rates during the 2017–2025 period. Further strengthening of surveillance systems, prevention strategies, and healthcare interventions is required to accelerate progress toward tuberculosis elimination.

INTRODUCTION

Tuberculosis (TB) is a chronic infectious disease caused by the bacterium *Mycobacterium tuberculosis* that remains a major global public health challenge (Vasiliu et al., 2024). Global efforts toward TB elimination are strongly influenced by the effectiveness of surveillance systems, active and passive case-finding strategies, and policies addressing barriers experienced by vulnerable populations (Donnan et al., 2025). Furthermore, improving early diagnosis, strengthening cross-sectoral coordination, and implementing large-scale prevention strategies are essential to interrupt TB transmission chains (Agizew et al., 2022). However, TB control programs aimed at achieving elimination targets continue to face various challenges, including regional disparities in case distribution, limited healthcare infrastructure, and fluctuations in reported cases. Therefore, monitoring epidemiological trends is essential to reduce TB morbidity and mortality effectively. This study analyzed annual TB surveillance data from West Java Province, which has one of the highest TB burdens in Indonesia, to examine temporal trends in TB cases. The study aimed to analyze temporal trends in incidence rates (IR) and case

fatality rates (CFR), as well as evaluate TB control strategies in West Java.

The research gap addressed by this study lies in the limited availability of comprehensive temporal analyses examining TB incidence and case fatality rates in West Java during the critical period of 2017–2025, along with insufficient understanding of the specific challenges and opportunities for accelerating TB elimination efforts in the province. Although previous studies have explored spatial distribution, drug resistance, and treatment outcomes in specific locations, limited research has systematically analyzed provincial-level trends while integrating an evaluation of TB control strategies across all 27 districts and cities. Furthermore, existing literature has not fully addressed systemic barriers affecting treatment success, including interactions among healthcare system limitations, patient adherence, and environmental factors influencing TB transmission and mortality in high-burden settings. The urgency of this research is further emphasized by projections indicating that Indonesia may face challenges in achieving the 2030 TB elimination target, with future estimates suggesting that TB incidence may remain substantially above the expected benchmark. These challenges are influenced by persistent transmission, treatment gaps, and the emergence of drug-resistant TB, indicating that existing control strategies require further strengthening in terms of coverage, integration, and effectiveness (Ahuja et al., 2023; Damen et al., 2025).

The novelty of this research lies in its comprehensive temporal analysis of TB incidence and case fatality rates over an extended nine-year period (2017–2025) across West Java Province, providing an updated overview of TB epidemiological trends in one of Indonesia's highest-burden regions. This study integrates epidemiological indicators, including TB case trends, treatment outcomes, treatment success rates, and mortality patterns, with an evaluation of challenges affecting TB elimination efforts. Unlike previous studies that have focused on specific components of TB control, this research provides a broader assessment of program performance by examining disease trends and treatment outcomes simultaneously. The study contributes to the growing evidence base on TB elimination in high-burden settings by documenting provincial-level experiences and identifying actionable strategies to strengthen TB control programs. By highlighting implementation gaps and potential intervention priorities, this research provides insights that may support policy development and inform TB elimination efforts in West Java and other regions with similar challenges.

This study aimed to analyze temporal trends in incidence rates (IR) and case fatality rates (CFR), as well as TB control strategies in West Java from 2017 to 2025. The research objectives included examining annual TB trends by year and sex, analyzing treatment outcomes including cure rates, treatment completion rates, and treatment success rates, evaluating case fatality rates and their implications for program effectiveness, and identifying key challenges and opportunities for strengthening TB elimination efforts in the province. The findings provide evidence to support policy formulation, resource allocation, and program improvement at provincial and national levels. The implications of this study extend beyond academic contributions by offering practical recommendations for strengthening healthcare systems, improving cross-sectoral collaboration, enhancing early detection strategies, and implementing targeted health education interventions to address persistent barriers to TB elimination. Ultimately, this research contributes to

national and global efforts to end the TB epidemic by providing empirical evidence and actionable recommendations to accelerate progress toward the 2030 TB elimination targets.

METHOD

This study employed a descriptive-analytical method with a retrospective cohort study design using secondary data. The study analyzed West Java Province Health Profile data from 2017 to 2025, including the number of TB cases, cure rates, treatment completion rates, treatment success rates, and deaths during the treatment period.

Data were obtained from the West Java Health Office (<https://diskes.jabarprov.go.id/profilkesehatan>). The incidence rate was calculated by dividing the number of new TB cases by the total population and expressed per 100,000 population. The case fatality rate was calculated by dividing the number of deaths by the total number of reported TB cases and presented as a percentage (%). In addition, cure rates (CR), treatment completion rates (TCR), and treatment success rates (TSR) were analyzed for the 2017–2025 period. Data analysis was performed using descriptive statistical methods to evaluate temporal trends in TB indicators.

RESULTS AND DISCUSSIONS

Temporal Trends in Tuberculosis Incidence

Between 2017 and 2025, the temporal trend of tuberculosis cases in West Java showed a significant and continuous increase. The total number of cases rose from 59,833 in 2017 to 225,389 in 2025, representing a cumulative increase of 276.7% compared to the baseline level. Throughout the analyzed period, the Average Annual Percent Change (AAPC) was 131.04%. This increase occurred consistently across both male (19.1%) and female (19.5%) groups, with no statistically significant difference between the two (Table 1).

Findings regarding the Treatment Success Rate (TSR) for tuberculosis cases in West Java from 2017 to 2025 indicate an upward trend; the highest figures were recorded between 2022 and 2025, rising from 77,020 to 181,996 cases. The Treatment Completion Rate (TCR) peaked in 2025 with 149,329 cases and was lowest in 2017 with 6,255 cases. Data on the Cure Rate (CCR) and Mortality During Treatment (MDT) for tuberculosis in West Java (2017–2025) are presented in Figure 1. The incidence of tuberculosis cases between 2017 and 2025 showed an increase and remained far above the national elimination target of <65 cases per 100,000 population; the highest number of cases occurred in 2024 (447,582 cases) and the lowest in 2017 (124,554 cases). The case fatality rate fluctuated, peaking at 0.025% in 2025 and reaching a low of 0.008% in 2017 (Figure 2).

Table 1. Dynamics of Tuberculosis in West Java by Sex and Cumulative Increase to 2017 (2017–2025)

Year	Sex		Total	Cumulative Increase vs 2017 Year, %
	Male	Female		
2017	34.726	25.107	59.833	0
2018	42.668	33.878	76.546	27.93
2019	59.765	49.698	109.463	82.95
2020	43.940	35.900	79.840	33.44
2021	48.544	42.249	90.793	51.74

Year	Sex		Total	Cumulative Increase vs 2017 Year, %
	Male	Female		
2022	87.616	73.045	160.661	168.52
2023	116.430	95.529	211.959	254.25
2024	127.295	102.388	229.683	283.87
2025	124.918	100.471	225.389	276.70
Overall	685.902	558.265	1.244.167	131.04

Table 2. The total number of reported cases with Tuberculosis, cured, completed, success and death case in West Java from 2017-2025

Region	Total Case	Cured	Treatment Complete	Success Rate	Death
Bogor	167892	26416	97310	131475	3063
Sukabumi	66116	12643	32148	48187	352
Cianjur	63058	7420	34996	48694	725
Bandung	78102	13706	43468	60802	1640
Garut	53791	9140	28589	40313	882
Tasikmalaya	27088	8969	10369	21321	917
Ciamis	20476	5346	9846	15890	459
Kuningan	24164	6498	10603	19440	627
Cirebon	54477	13628	25271	43151	1170
Majalengka	25324	8827	9851	19210	399
Sumedang	21430	3528	10731	16420	647
Indramayu	30241	3647	15205	23599	756
Subang	35153	5234	22443	27252	758
Purwakarta	28584	4125	15786	20953	402
Karawang	64003	11609	29879	42070	1320
Bekasi	68850	9969	30976	42727	740
Bandung Barat	24596	5456	12143	18950	435
Pangandaran	5526	1401	2498	4047	154
Kota Bogor	52032	7925	27166	36234	1237
Kota Sukabumi	19218	2825	10295	16357	380
Kota Bandung	104124	11426	63052	76585	2482
Kota Cirebon	21128	3844	10044	14728	350
Kota Bekasi	79875	10463	38919	55081	1138
Kota Depok	50779	11088	22996	38081	1210
Kota Cimahi	27850	3738	17752	28959	295
Kota Tasikmalaya	22851	4834	10328	17437	571
Kota Banjar	7439	1425	3886	6295	115
West Java	1.244.167	215.130	646.550	934.258	23.224

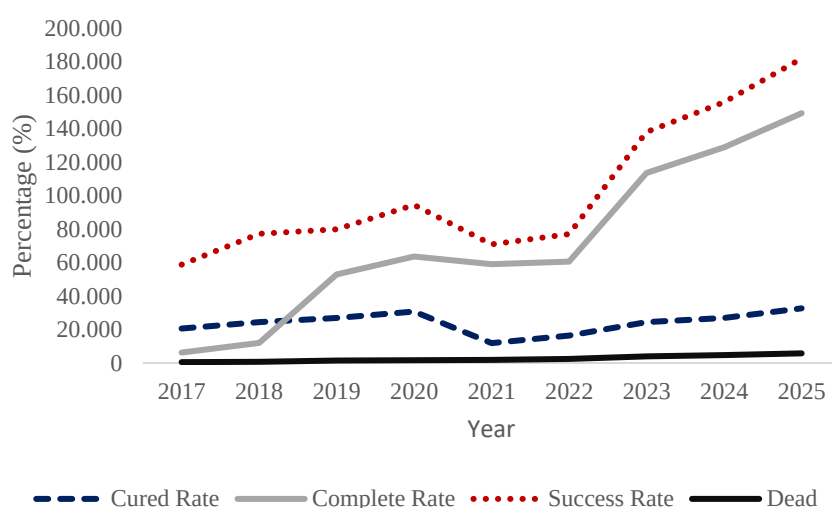


Figure 1. The case cure rate, complete rate, success rate, and death of tuberculosis in West Java 2017-2025

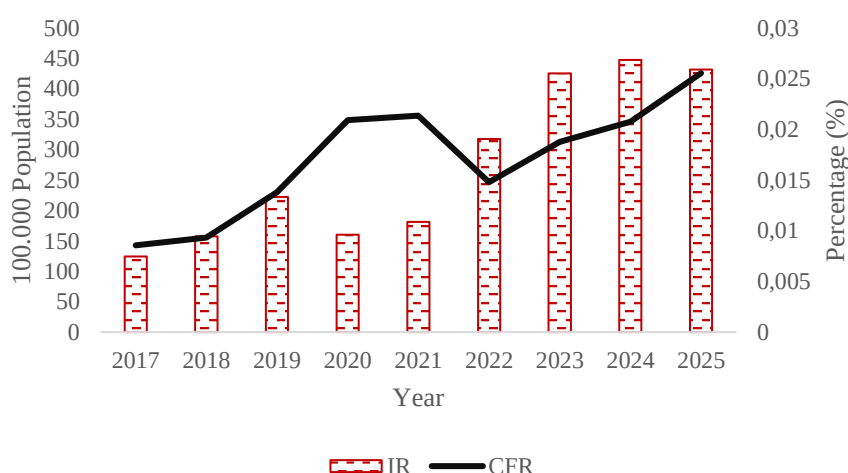


Figure 2. Morbidity and mortality of tuberculosis in West Java from 2017-2025

The simultaneous rise in TB cases and the Case Fatality Rate (CFR) indicates that TB management programs and strategies in West Java have not been fully effective. This situation is driven by factors such as patient clinical status, immune status, and comorbidities, alongside risk factors including poor housing conditions, contact history, advanced age, and migrant status—all of which influence treatment failure and mortality (Rabahi et al., 2017; Saputra et al., 2017; Yigci et al., 2025). TB transmission within the community is influenced by individual immunity, the duration of exposure to the causative pathogen, and environmental conditions, such as population density and frequently visited social venues (e.g., places of worship or other gathering spots) (de et al., 2022).

Analysis results indicate that patient treatment adherence is a critical determinant of high treatment success rates (TSR), which in turn can prevent loss to follow-up (LTFU) (Mardia et al., 2025). High treatment success rates are closely linked to social and demographic factors, as well as the clinical symptoms experienced by patients (Ouaaziz et al., 2024). Patient adherence to completing the prescribed treatment regimen according to

schedule is essential to prevent the development of bacterial drug resistance (Juliana et al., 2024). Community and family participation—through Directly Observed Treatment (DOT) monitoring, motivation, and stigma reduction—can enhance patient adherence and treatment success (Kedthongma et al., 2026).

Strategies for TB control and elimination must be developed optimally and synergistically through contact tracing, rapid molecular testing, continuous DOT monitoring at health facilities, and the provision of health education or counseling to communities across all regions (Wulandari & Christin, 2024; Zetola et al., 2021). Increasing the detection rate of both drug-sensitive and drug-resistant tuberculosis cases can reduce morbidity and mortality while accelerating the diagnostic process (Simbolon et al., 2025). A tuberculosis diagnosis is established based on clinical signs and symptoms, laboratory findings—including direct microscopy and solid or liquid culture—and rapid molecular testing using GeneXpert MTB/RIF; the latter offers higher sensitivity for detecting the *Mycobacterium tuberculosis* complex and assessing resistance to rifampicin, isoniazid, and fluoroquinolones (Shrivastava & Singh, 2025).

Epidemiological analysis is crucial for understanding the distribution of tuberculosis cases in West Java, enabling management and treatment efforts to be concentrated in regencies and cities with high case burdens. However, this study is limited by its reliance on secondary data. Further research is needed to examine the impact of socioeconomic factors—such as access to healthy housing, hygiene practices, and poverty levels—to accelerate TB elimination in Indonesia.

CONCLUSION

The tuberculosis elimination program in West Java has not yet achieved optimal performance and continues to face significant challenges, as indicated by the persistent increases in TB incidence and case fatality rates from 2017 to 2025. The temporal trend analysis demonstrated a cumulative increase of 276.7% in TB cases during the study period, with case numbers remaining substantially above the national TB elimination target of fewer than 65 cases per 100,000 population. The treatment success rate of 80% remained below the national target of 90%, while case fatality rates fluctuated and reached a peak of 0.025% in 2025, indicating that existing TB control efforts have not yet achieved optimal effectiveness. Several factors may have contributed to these outcomes, including patient-related factors such as comorbidities, clinical conditions, and treatment adherence; health system factors such as limitations in recording and reporting systems, drug supply management, and coordination among healthcare facilities; and environmental and social determinants, including population density, poverty, and housing conditions. These findings highlight the need for comprehensive improvements through strengthened epidemiological analysis, equitable access to quality healthcare services, early detection strategies, sustained cross-sectoral collaboration, and health education initiatives to increase public awareness and promote Clean and Healthy Living Behaviors (PHBS), thereby reducing TB transmission and disease burden in West Java.

Based on these findings, several recommendations are proposed to strengthen TB control and elimination efforts in West Java and other high-burden settings. First, recording and reporting systems should be improved to ensure complete and accurate documentation of TB cases and treatment outcomes, thereby reducing gaps related to underreporting, loss to follow-

up, and inaccurate assessment of treatment success. Second, the provincial government should expand active case-finding strategies, particularly in high-burden areas and vulnerable populations, by optimizing the roles of community health workers, integrated screening programs, and digital health innovations such as the SMART Free Health Check program. Third, treatment adherence should be strengthened through improved Directly Observed Treatment (DOT) monitoring, family and community support, and interventions addressing social and behavioral barriers to treatment completion. Fourth, cross-sectoral collaboration should be enhanced to address social determinants of TB, including poverty, malnutrition, diabetes, and smoking, through coordinated interventions involving the health, social welfare, and economic sectors. Fifth, sustained health education programs should be implemented to promote Clean and Healthy Living Behaviors (PHBS), reduce TB-related stigma, encourage early healthcare-seeking behavior, and improve treatment outcomes. Future research should include longitudinal studies evaluating the long-term effects of TB interventions, comparative studies of successful TB control programs in other high-burden regions, and implementation research examining barriers and facilitators affecting TB program delivery at district and community levels. Further investigation into the socio-economic determinants of TB transmission, treatment outcomes, and the effectiveness of innovative diagnostic and therapeutic approaches is also needed to strengthen evidence-based policies and practices. Ultimately, achieving TB elimination in West Java requires sustained political commitment, adequate resource allocation, and a comprehensive evidence-based approach that addresses both biomedical factors and the broader social determinants influencing the TB epidemic.

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