

Digital Transformation of Tuberculosis Surveillance in Papua New Guinea: Scaling up Electronic TB Reporting in a Geographically Dispersed, High-Burden Setting

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Abstract

Background: Papua New Guinea (PNG) is a high tuberculosis (TB) burden country with a substantial burden of rifampicin-resistant/multidrug-resistant TB. Its geographically dispersed population, including remote and hard-to-reach communities across 22 provinces, presents major challenges for health service delivery and disease surveillance. Historically, the National Tuberculosis Program (NTP) relied on paper-based reporting from Basic Management Units (BMUs), resulting in delayed and incomplete reports. In 2022, 24% of BMUs did not submit routine TB reports to the NTP. The objective of the electronic rollout of this study is to improve the timeliness, completeness, accessibility, and quality of routine TB surveillance through phased implementation of an electronic TB reporting system (e-TB) at BMU level.

Methods: The NTP introduced a web-based e-TB system enabling electronic TB data entry and submission using tablets or smartphones. Following a pilot in 2017, the system was progressively expanded across provinces and BMUs, supported by health-care worker training, refresher training, supportive supervision, and onsite technical assistance. Implementation data from 2017 to the first quarter of 2024 were reviewed.

Results: By the first quarter of 2024, e-TB had been rolled out in 13 of 22 provinces and 180 of 257 BMUs (70%). All participating BMUs had received e-TB training and were submitting quarterly reports electronically. Electronic reporting increased from 15 BMUs in 2017 to 180 by the first quarter of 2024. Reporting timeliness progressively improved following implementation, demonstrating the feasibility of transitioning from paper-based to electronic reporting despite geographical, infrastructure, logistical, and human resource constraints.

Conclusion: Digital TB surveillance is feasible in geographically dispersed, resource-constrained settings. Continued investment in connectivity, equipment, user capacity, supervision, data quality, and system maintenance is essential for nationwide coverage. The e-TB platform provides a foundation for integrated TB surveillance, commodity management, performance monitoring, and program governance.

Keywords: Electronic TB Rollout for TB Surveillance in PNG

1. Introduction

Papua New Guinea (PNG) is a high tuberculosis (TB) burden country, including a significant burden of rifampicin-resistant/multidrug-resistant TB (RR/MDR-TB). The majority of the population lives in rural and geographically remote communities distributed across 22 provinces, creating significant challenges for

the delivery of health services and routine disease surveillance.

Historically, the National Tuberculosis Program (NTP) has relied predominantly on paper-based reporting from Basic Management Units (BMUs) to the national level. Data collected through these reporting systems are essential for monitoring TB case

detection, treatment outcomes, program performance, commodity requirements, and informing national planning and strategic decision-making.

However, paper-based reporting has been affected by multiple challenges, including limited human resources, variable reporting capacity, logistical constraints, transportation difficulties, and the geographical isolation of many health facilities. Consequently, reports are frequently submitted late or are not received by the NTP. In 2022, 61 of 254 BMUs (24%) did not submit routine TB reports to the NTP, highlighting a significant gap in the completeness and timeliness of national TB surveillance data [1].

2. Intervention and Response

To address these challenges, the NTP introduced an electronic TB reporting system (e-TB) to improve the timeliness, completeness, accessibility, and quality of TB surveillance data.

The e-TB system enables TB data to be entered directly at the BMU level using a tablet or smartphone through a web-based

platform. The system was initially piloted at two sites in 2017 and was subsequently expanded to additional provinces and BMUs.

The scale-up has been supported through training of health-care workers, refresher training, supportive supervision, and onsite technical assistance. The approach has progressively shifted TB reporting from paper-based systems toward direct electronic data entry and submission.

3. Results

By the first quarter of 2024, e-TB had been fully rolled out in 13 of PNG’s 22 provinces (59%). A total of 180 BMUs had been supported to use the e-TB system, representing approximately 70% of the 257 BMUs. All 180 BMUs included in the rollout had received training in e-TB reporting.

The remaining nine provinces had not yet achieved full BMU-level implementation; however, TB data entry was done electronically and being undertaken at the provincial level.

Indicator	2017	2022	2023	2024 Q1	Total
Number of provinces with e-TB rollout	1	7	3	2	13/22 (59%)
Number of BMUs with e-TB rollout	14	79	43	44	180/257 (70%)
Number of BMUs submitting quarterly reports electronically	14	94	136	180	180
Number of BMUs trained in e-TB reporting	14	79	43	44	180/180 (100%)

Table 1: Scale-up of the Electronic TB Reporting System in Papua New Guinea

Timeliness of TB report submission has progressively improved following the introduction of e-TB. The NTP continues to support implementation through refresher training, onsite supervisory visits, and technical support to address data entry and reporting challenges.

The original program target was to phase out paper-based TB reporting by the end of 2024 and achieve 100% online submission of BMU reports. Full implementation of electronic reporting is expected to provide the NTP with more complete, timely, and accurate national TB surveillance data, enabling faster analysis and more responsive programmatic decision-making.

Beyond routine TB surveillance, there is considerable potential to expand the functionality of the e-TB platform. Possible future applications include TB drug and commodity stock management, human resource tracking, monitoring of program performance, supervisory activities, and strengthening program governance and coordination [2].

4. Conclusion

The transition from paper-based TB reporting to an electronic surveillance system demonstrates the potential for digital health solutions to strengthen TB program monitoring and decision-making in Papua New Guinea.

Despite significant geographical, logistical, infrastructure, and human resource challenges, implementation of an electronic TB reporting system at the BMU level has been feasible in a resource-constrained and geographically dispersed setting.

The experience demonstrates that progressive digitalization of TB surveillance can improve the availability, completeness, timeliness, and quality of routine program data. Continued investment in connectivity, equipment, user training, supportive supervision, data quality assurance, and system maintenance will be critical to achieving nationwide coverage and sustaining the benefits of e-TB.

The e-TB platform also provides an opportunity to move beyond electronic reporting toward an integrated digital TB program management system that can support surveillance, commodity management, human resources, performance monitoring, and program governance.

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Conflict of Interest

No conflict of interest declared and also no potential conflict of interest

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