Tuberculosis Data Quality Review

in the Democratic Republic of the Congo

Report

January 2024

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TB DIAH
Tuberculosis Data, Impact Assessment and Communications Hub

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PROGRAMME NATIONAL DE LUTTE CONTRE LA TUBERCULOSE
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Cover

Data Quality Review at a TB health facility in Kinshasa, DRC. Photo Credit: Jeanne Chauffour

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Version française du rapport

This report is also available in French. *Ce rapport est aussi disponible en français au lien suivant :* https://www.tbdiah.org/resources/publications/examen-de-la-qualite-des-donnees-de-tuberculose-en-rdc-rapport/

Abbreviations

ART	antiretroviral therapy
DHIS2	District Health Information Software, version 2
DQR	data quality review
DR-TB	drug-resistant tuberculosis
DRC	Democratic Republic of the Congo
DS-TB	drug-susceptible tuberculosis
HMIS	health management information system
HZ	health zone
M&E	monitoring and evaluation
MDR-TB	multidrug-resistant tuberculosis
NTP	national TB program
PATI	Programme anti-tuberculeux intégré aux soins de santé primaire
PNLT	Programme national de lutte contre la tuberculose
POSAF	Pont Santé Afrique
QTSA	Quality of TB Services Assessment
RR-TB	rifampicin-resistant tuberculosis
SOP	standard operating procedure
TB	tuberculosis
TB DIAH	Tuberculosis Data, Impact Assessment and Communications Hub
TOT	training of trainers
TPT	tuberculosis preventive treatment
USAID	United States Agency for International Development
VF	verification factor
WHO	World Health Organization

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Executive Summary

Background

The Democratic Republic of the Congo (DRC) faces a high tuberculosis (TB) incidence and challenges in TB management and elimination. Reliable, timely, and complete data on TB cases, drug resistance, and outcomes are key to improving and adapting TB elimination efforts to the needs of affected areas. To assess the quality of TB data and the performance of reporting systems in the country, the Tuberculosis Data, Impact Assessment and Communications Hub (TB DIAH) project conducted a TB Data Quality Review (DQR) with the objectives of assessing the components and functionality of the TB information system to generate high-quality TB data and reviewing and validating indicator data for selected TB indicators for a specific reporting period.

Methods

The TB DQR aimed to evaluate the quality of TB services, data accuracy, and reporting systems in DRC. The DQR was part of a larger quality of care cross-sectional study involving 227 TB diagnostic and treatment facilities, both public and private, across six provinces in the DRC.

A multistage sampling procedure was used, stratifying provinces based on TB treatment success rates. For each selected health zone within the selected provinces, a census of health facilities providing TB services was conducted.

The World Health Organization (WHO) DQR tool (WHO, 2020) was adapted to focus on two TB indicators deemed strategically important by the DRC's National TB Program (*Programme national de lutte contre la tuberculose*, or PNLT). The tool followed WHO guidelines for data verification exercises and included qualitative components to assess weaknesses in the reporting system.

The data verification component aimed to compare validated results to reported results to determine accuracy. The verification factor (VF) measured accuracy, with acceptable values ranging from 0.9 to 1.1 (90% to 110%). The system assessment component measured whether the information system reporting on health service outputs has all the necessary elements to produce timely, quality data, and whether these elements are functioning optimally. These two components help identify areas of strength and weakness, thereby facilitating the elaboration of plans and interventions to improve information systems and data quality.

Data were collected electronically on tablets using SurveyCTO, allowing real-time data management and cleaned and analyzed following the end of the data collection phase.

Results

Strengths in Data Reporting: Most health facilities (94%) have designated staff responsible for data reporting, receive appropriate training, and undergo regular supervision. A systematic process for quality checks in data compilation exists, which contributes to data accuracy.

Challenges in Data Collection Tools: Availability and standardization of TB data collection tools vary across facilities. The TB monitoring and evaluation (M&E) framework and standard definitions for key TB indicators are often lacking (46% of facilities did not have the M&E

framework and standard written definitions for key indicators were missing in 35% to 66% of cases). Written guidelines for reporting are insufficient (46% to 51% of facilities having no written guideline about what to report to whom, how, and when).

Quality of Data for Drug-Susceptible TB: For drug-susceptible TB (DS-TB) reporting, data accuracy is relatively high, with a VF of 1.02 (i.e., 102%). However, discrepancies arise from incorrect information and arithmetic errors. Missing data elements are prevalent (a third of entries in the DS-TB registers have at least one key data element missing).

Quality of Data for Drug-Resistant TB: Drug-resistant TB (DR-TB) data are consistently reported with a VF of 1 (i.e., 100%). Challenges include missing data on treatment outcomes and the availability of quarterly reports (two in five entries in the DR-TB registers have at least one key data element missing and the quarterly reports for DR-TB were unavailable in more than half of the facilities assessed).

Recommendations and Conclusion

Standardize Data Collection Tools: Efforts should be made to standardize and streamline the use of TB data collection and reporting tools. Facilities should be equipped with updated, standardized tools that are easily accessible.

Training and Support: In-service training should address common errors in data recording and reporting. More guidance on data quality checks and reporting instructions should be provided to facility staff.

Enhance Electronic Reporting: As Internet access improves in the DRC, facilities should receive the necessary hardware and software, and staff should be trained to be able to use electronic data reporting systems, aligning with global digital health best practices.

Focus on DR-TB Reporting: Specific attention should be given to improve data completeness related to following-up people with DR-TB. Their treatment outcomes should be consistently and accurately recorded and reported

Expand Access to TB Frameworks: The availability and reference to the TB M&E framework and standard definitions for key TB indicators should be increased at health facilities.

The findings highlighted the need to standardize data collection tools, enhance training, improve electronic reporting capabilities, and focus on DR-TB reporting. Addressing these recommendations will strengthen the TB data reporting system in the DRC, leading to enhanced data accuracy and completeness. This, in turn, will contribute to more effective TB control and improved patient care. By building on existing strengths and addressing identified challenges, the DRC can advance its commitment to TB control and better health outcomes for its population.

Background

Policymakers, program managers, and donors require high quality data to manage health services and programs and monitor progress and effectiveness. Complete, reliable, timely information is critical to guide evidence-based decision-making by stakeholders, especially implementers. Globally, policymakers and funding agencies are increasingly interested in the measurement of indicators to capture key information about health services and programs including tuberculosis (TB). Since program management decisions should be based on evidence, it is essential to develop quality assurance mechanisms that promote reliable data collection, storage, and management to ensure generation of quality data to inform indicators. Because the National TB Program (NTP) of the Democratic Republic of the Congo (DRC), called the Programme national de lutte contre la tuberculose (PNLT), is addressing the prevention, diagnosis, care, and treatment of people affected by and infected with TB, assessing program effectiveness and management depends on the development and maintenance of strong monitoring and evaluation (M&E) systems in the country health system.

Tuberculosis and Tuberculosis Data Quality in the DRC

The DRC has a significant burden of TB, with an estimated TB incidence rate of 318 per 100,000 (World Health Organization [WHO], 2021). Among the 30 high-burden TB countries that accounted for 87 percent of all estimated incident cases worldwide, eight of them accounted for more than two-thirds of the global total, including the DRC, which accounted for nearly 3 percent of the global total (WHO, 2022). The DRC is one among just ten countries that the WHO has classified as having a high burden of TB, TB/HIV co-infection, and multidrug-resistant TB (MDR-TB) and rifampicin-resistant TB (RR-TB) (WHO, 2022).

In 2021, the country reported a total of 214,408 new and relapse cases, and cases with unknown previous TB treatment, of which more than 22,000 were children younger than 15 years of age (WHO, 2021). The evidence of high prevalence of TB across age groups demonstrates that transmission is still widespread despite implementation of the End TB Strategy.

Despite nearly doubling its case notification of people newly diagnosed with TB between 2015 and 2021, the TB detection gap has persisted over the past 10 years with almost 90,000 cases missing in 2021 (WHO, 2022). The country ranked tenth worldwide for the size of the gap between notified cases and estimated TB incidence (WHO, 2022).

In 2021, the national treatment coverage rate was 70 percent, the treatment success rate was 94 percent (for the 2020 cohort), and the case fatality ratio was 17 percent (WHO, 2021). Antiretroviral therapy (ART) coverage for TB/HIV coinfected individuals was high: 82 percent of HIV-positive people with TB were on ART (WHO, 2021).

According to the most recent estimates of drug-resistant TB (DR-TB), 1.6 percent of new cases and 20 percent of previously treated cases were MDR-TB/RR-TB cases (WHO, 2021). The DRC is one of the 10 countries that account for about 70 percent of the global gap between the estimated global incidence of MDR-TB/RR-TB each year and the number of people enrolled in treatment (WHO, 2022).

Despite efforts to improve case detection and reporting, the quality of TB case notification data in the DRC has been found to be suboptimal. A study by Baruani et al. (2021) found that only 39

percent of notified TB cases in the DRC had a confirmed diagnosis, and the remaining cases were based on clinical suspicion or presumptive diagnosis. In addition, the study found that the completeness and accuracy of TB case notification forms were inadequate, with missing or incorrect data reported in over half of the forms reviewed.

The findings of Baruani et al. (2021) are consistent with previous studies that have identified challenges in the quality of TB case notification data in the DRC (Kayembe et al., 2017; Kapay et al., 2018). These studies have highlighted the need for targeted interventions to improve the quality of TB case notification data in the country, including strengthening laboratory services, improving training and supervision of health workers, and implementing electronic reporting systems. These data also highlight important gaps and the need for quality data collection and reporting that contribute to prevention efforts, quality of care, and successful treatment outcomes.

More information about the DRC PNLT's structure, strategy, and programmatic response to TB can be found here: https://www.tbdiah.org/resources/publications/quality-of-tuberculosis-services-assessment-in-drc-report/

Data Quality Review (DQR)

The Data Quality Review (DQR) tool is a comprehensive system designed to evaluate the quality of data collected in health facilities. The DQR tool was developed by the WHO as part of its ongoing efforts to strengthen health information systems and ensure accurate and reliable health data (WHO, 2020). The tool was created in response to the growing recognition of the critical role that data quality plays to make evidence-based decisions about development programs, policies, and operations. It was developed through a collaborative process involving experts from WHO and other global health partners, as well as input from national health authorities and stakeholders from around the world.

The development of the DQR tool involved a comprehensive review of existing data quality assessment tools and frameworks, as well as an extensive consultation process with health data experts and practitioners. The aim was to create a user-friendly, adaptable, and evidence-based tool that could be used by health systems at all levels, from national to local, to assess the quality of their health data across different domains, such as health service delivery, health information management, and health information systems.

The DQR tool is designed to be flexible and can be customized to suit the specific needs and contexts of different countries and health systems. It provides a systematic approach for assessing data quality, including data accuracy, completeness, consistency, timeliness, and relevance.

Since its development, the DQR tool has been widely adopted by countries and health systems around the world as a valuable resource for assessing and improving the quality of their health data. It has been used in various settings, including national health information systems, health facility assessments, and health surveys. The DQR tool has contributed to enhancing the quality and reliability of health data, supporting evidence-based decision-making, and improving health outcomes for populations globally.

The DQR tool is designed to be adaptable to different contexts and health systems, and it can be used for various types of health facilities, including hospitals, clinics, and community health

centers. It provides a structured process for data quality assessment that involves reviewing the completeness, accuracy, and consistency of data. The DQR tool also enables health systems to identify gaps in data quality and develop strategies to address these gaps, which can help to improve the overall quality of healthcare services. Overall, the WHO DQR tool is an essential tool for strengthening health information systems and improving the quality of health data globally.

Study Purpose and Objectives

Purpose

In the DRC, the PNLT wanted to assess the quality of TB services concurrently with the quality of TB data. Therefore, in 2022 a joint Quality of TB Services Assessment (QTSA) and DQR activity was planned and conducted to assess the quality of TB services and TB data quality in a random sample of TB diagnosis and treatment facilities in the country.

Although this technical report will focus on presenting the results of the DQR, the objectives of the joint QTSA and DQR activity are presented below.

Objectives

The objectives of the DQR and QTSA study were to:

- Assess the components and functionality of the TB information system to generate high-quality TB data.
- Review and validate indicator data for selected TB indicators for a specific reporting period.
- Determine the availability of TB services (i.e., screening, diagnosis, treatment, care and follow-up, laboratory services). *(This objective was specific to the QTSA and is further discussed in the QTSA report.)*
- Assess the availability of facility infrastructure (as well as maintenance), skilled providers, commodities, and organizational structures that support TB service delivery. *(This objective was specific to the QTSA and is further discussed in the QTSA report.)*
- Assess TB providers' knowledge, skills, and ability to deliver appropriate TB services. *(This objective was specific to the QTSA and is further discussed in the QTSA report.)*
- Assess patient satisfaction with TB services. *(This objective was specific to the QTSA and is further discussed in the QTSA report.)*
- Examine the linkages among TB diagnosis, treatment initiation, and treatment outcomes. *(This objective was specific to the QTSA and is further discussed in the QTSA report.)*

The DRC's NTP and other TB stakeholders can use the nationally representative results and recommendations to strengthen national protocols, and to develop programs and interventions to improve TB service delivery and the quality of services. These results can be used as a baseline to measure changes in quality of services and data quality over time.

Quality of TB Services Assessment (QTSA)

The QTSA was administered by the same data collection teams and at the same health facilities as were the DQR tool and was conducted using the QTSA method. The method and results from the QTSA are presented in a separate report available here: https://www.tbdiah.org/resources/publications/quality-of-tuberculosis-services-assessment-in-drc-report/

Methods

Study Design, Sampling Procedure, and Sample

The DQR was implemented as part of a larger quality of care cross-sectional study on a nationally representative sample of 227 TB diagnostic and treatment facilities (both public and private sector) in the DRC. The results are representative at the national level.

Two hundred and twenty-nine health facilities were randomly selected using a multistage sampling procedure to achieve a nationally representative sample. Of the 229 facilities, 227[1] were included in the survey.

Due to recent migration of the NTP's information system to a new platform, data on TB case notification was incomplete and could not be used to stratify provinces and health zones (HZs). Therefore, TB treatment success was used in combination with data on case notification to identify and rank provinces. Provinces were then sorted and categorized based on these two variables into three strata (high, medium, and low) from which they could be randomly selected. Two provinces were randomly selected from each stratum for a total of six provinces out of 26 across the country (Figure 1).

In the second stage of HZ selection, the same method was used to identify and rank HZs in the selected provinces based on TB case notification and treatment success rates. Seven to 10 HZs were randomly selected from each province. The number of HZs varied based on the number of facilities required for the sample. Overall, 51 total HZs were selected.

More information about the administrative organization of provinces, HZs, and health areas (aires de santé), the functional role of health facilities, and the recommended catchment population of these facilities can be found in the QTSA report on page 15.

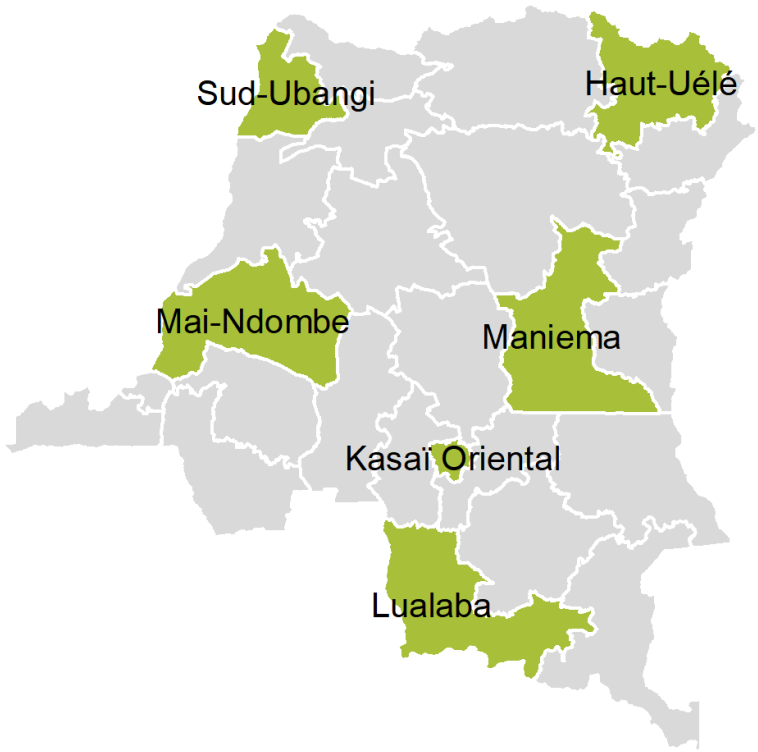
The following provinces and HZs were sampled for the DQR in the DRC:

- Haut-Uélé (HZs: Dungu, Isiro, Makoro, Niangara, Pawa, Rungu, and Watsa)
- Kasaï-Oriental (HZs: Bipemba, Bonzola, Diulu, Kabeya Kamwanga, Kansele, Lukelenge, Miabi, Muya, Nzaba, Tshishimbi)
- Lualaba (HZs: Bunkeya, Dilala, Dilolo, Fungurume, Kanzenze, Kasaji, Lubudi, and Mutshatsha)
- Maï-Ndombe (HZs: Bokoro, Bolobo, Mimia, Mushie, Ntandembelo, Oshwe, and Yumbi)
- Maniema (HZs: Alunguli, Kalima, Kampene, Kasongo, Kibombo, Kunda, Lubutu, Lusangi, Obokote, and Tunda)
- Sud-Ubangi (HZs: Bangabola, Bokonzi, Bominenge, Bulu, Kungu, Mawuya, Ndage, Tandala, and Zongo)

[1] Two facilities were dropped from the original sample because it was subsequently determined that they did not provide TB services during the period of interest for the study.

In the third stage, all health facilities (i.e., a census) were selected given the small number of health facilities per HZ.

Figure 1. Map of provinces selected for the DRC DQR



Data Collection Instrument

The DQR was conducted using the TB DQR which is based on the WHO DQR module. It is a data verification exercise for two TB indicators selected by the PNLT based on strategic importance.

Developed by the WHO and its partners, the DQR uses a standard set of indicators, data collection tools, analytics, and formats to present results. Implementing countries adapt the forms and tools to meet their specific needs. The standard DQR method calls for the inclusion of one indicator from each of five health programs: maternal health, immunization, HIV/AIDS, TB, and malaria as part of its data verification exercise. A qualitative component, called the systems assessment, allows identification of weaknesses in the reporting system that contribute to data quality issues. The adaptation of the DQR to a single health program is called the "in-depth" method. The DRC DQR for TB used the in-depth adaptation of the DQR to implement the DQR for TB. One DQR was conducted at each sampled health facility.

The DQR Tool is available in English and in French alongside the QTSA Tools used in the DRC at this link: https://www.tbdiah.org/resources/publications/quality-of-tuberculosis-services-assessment-in-congo-tools/

Data Verification

Data verification is the quantitative comparison of a validated result to a reported result. The key objective of data verification is to determine the accuracy of reporting: that is, are the data that are being reported an accurate reflection of the level of service delivery in the health facilities? Accuracy of reporting is measured as the ratio of the recounted (or verified) results over the reported results. The resulting statistic, the verification factor (VF), is a measure of the accuracy of reporting for the indicator. A VF of less than 100 percent indicates that the validated result is less than what was reported (over-reporting), and a VF of greater than 100 percent means that the validated results exceeded what was reported (under-reporting). Perfect congruence between the validated and reported values yields a VF of 1.0 (i.e., 100%).

In general, acceptable values of the VF range between 0.9 and 1.1 (i.e., 90% to 110%). Since the occurrence of both over-reporting and under-reporting can mask the extent of divergence from complete coherence between validated and reported (i.e., a VF of 1.0, or 100%), the extent of variation is also calculated. The percentage of facilities over-reporting and under-reporting by more than 10 percent is also calculated. The analysis also includes the percentage of facilities with complete match between recounted and reported.

The 2022 DRC DQR aimed to validate data reported from the sampled health facilities for a selected reporting period, January to March 2021 (for both DS-TB and DR-TB case notification). The two indicators assessed in the DRC DQR were selected by the PNLT in discussions with the Tuberculosis Data, Impact Assessment and Communications Hub (TB DIAH) through its local partner Pont Santé Afrique (POSAF) based on their level of priority and pertinence. The validation requires recompilation of the selected indicators using archived data from completed data collection tools at the sampled health facilities to derive a “validated” value for the indicator at the facility. The validated indicator values were compared to values reported by the same facilities for the same reporting period to obtain a VF for each indicator and facility. The reported values were abstracted from the archived quarterly (trimester) reporting forms at the facility from the selected reporting period.

The following data were collected for each of the two indicators:

- Determination of whether the facility provides the specific health service
- Determination of whether the facility reports the data to the HZ
- Identification of the reporting system used to report the collected data
- Identification of the source document for recording the delivery of services
- Determination of the availability and adequacy of necessary source documents and reporting forms
- Recount of the indicator for the selected quarter on source documents
- Recording of the value for the indicator for the quarter reported to the next level on the monthly report
- Reasons for discrepancies (if any)
- Completeness of recording of tracer data elements in source documents

System Assessment

The system assessment measures whether the information system reporting on health service outputs has all the necessary elements to produce timely, quality data, and whether these elements are functioning optimally. The system assessment helps identify areas of strength and weakness, thereby facilitating the elaboration of plans and interventions for information system strengthening and improved data quality. The system assessment was conducted at each of the sampled facilities. The system assessment is qualitative, but the results are summarized as percentages. The system assessment at the facility level covered the following thematic areas:

- M&E structure and function
- Indicator definitions
- Reporting guidelines
- Data collection tools
- Quarterly reporting
- Data quality and supervision
- Data maintenance
- Confidentiality

Survey Implementation

Selection of a Local Research Organization

TB DIAH selected POSAF as the local research organization charged with field implementation of the DRC QTSA/DQR in 2021 after a fair and open selection process. TB DIAH and POSAF worked closely throughout the entirety of the study.

Tool Adaptation

The TB DQR tool was first translated into French by TB DIAH with support from a local consultant in the DRC. Then POSAF assembled a QTSA/DQR Steering Committee and led the adaptation of the QTSA and DQR tools to the DRC context. The customization of the tools took place in January and February 2022.

Pretest

The DRC QTSA/DQR tools were pretested in Kinshasa over a seven-day period in January 2022. The objective of the pretest was to administer the tools to verify that the questions were relevant and understood by respondents in the intended way, that the response options were comprehensive and appropriate, and that the sequencing of the questions was conducive to smooth data collection. To achieve this objective each tool was administered multiple times during the pretest and improved iteratively after each administration.

The pretest team consisted of TB DIAH, POSAF, and PNLT staff and QTSA/DQR steering committee members, and a selection of potential data collection team leads who were hired for the pretest to assess their data collection and leadership skills.

The seven facilities that participated in the pretest were located in four HZs across Kinshasa. In eastern Kinshasa, four health facilities (Elonga, Lunda, Kikimi, Maréchal) located in two HZs (Masina II, Kikimi) participated. In central Kinshasa, one facility (Libikisi) from Bandalungwa HZ participated. In western Kinshasa, two facilities (Libondi, Siloé) from Bumbu HZ participated.

The changes made to each tool were mainly related to rewording of certain questions and answer options, making certain questions/answers more specific, and reorganizing the order of certain questions. All changes were reflected in both the English and French versions of the tools.

Training of Trainers

The training of trainers (TOT) for the collection of field data for the DRC QTSA/DQR was organized in Kinshasa over the course of nine days in late March 2022. The overall objective of the TOT was for selected QTSA/DQR provincial field supervisors to be proficient with the QTSA/DQR protocol, method, and tools, including the use of SurveyCTO for electronic data collection. Additionally, the TOT was intended to ensure the field supervisors could be responsible and capable of training, supervising, and leading their data collection teams.

The TOT included two field practice days, but was otherwise focused on didactic reading, review, and comprehension of the tools, practice using the tablets, role-play, and preparing logistics for the field work.

Training of Data Collectors

Two data collection teams were assigned to each of the six study provinces. Data collectors were selected from within each province following a competitive selection process, to guarantee knowledge of the geography, local customs, and local languages. Two data collection team supervisors for each province, with support from either a POSAF, PNLT, or QTSA/DQR steering committee staff member, organized and facilitated six provincial training workshops in late April 2022. Each workshop trained 10 data collectors (four data collectors per team, with one substitute for each team participating in the training).

In addition to training the data collectors, team members from POSAF, PNLT, and the steering committee were responsible for facilitating contacts with local authorities and coordinating the team leaders in the organization of the training, including identifying facilities not sampled in the DQR where data collectors could practice administering the tools.

Data Collection and Management

Each province had a deployment plan, developed by the data collection teams and reviewed by POSAF prior to the teams' departure. The POSAF M&E team monitored the deployment and movement of the field teams on a daily basis throughout the entire duration of data collection. The POSAF administration, finance, and logistics team also conducted daily monitoring and made recommendations for changes to improve logistics and the efficiency of field activities, whenever necessary. Before team supervisors were deployed to the provinces, the POSAF communications team set up a communication system (telephone contacts, emails, and WhatsApp groups) allowing daily and effective liaison with the central POSAF team. Team

supervisors also organized themselves to create WhatsApp groups by province to allow smooth coordination.

All local administrative and facility management authorities were informed either before the departure of the field teams from Kinshasa or upon their arrival in the provinces, and authorizations to access health facilities were obtained before the departure of the field teams from Kinshasa. Each data collection team traveled with printed copies of the tools and a system was set up for the team leads to access cash to pay for the teams' expenses over the course of the data collection period.

Data were collected electronically on tablets using SurveyCTO, in the scheduled health facility This method of data collection allowed for real-time data management through the use of data limits, skip logic, and required responses as the tools were being administered. Data were uploaded daily on TB DIAH's server.

In terms of meeting the objectives set, the results were very satisfactory: the DQR Tool was administered at 99 percent of the sites (227 planned facilities versus 229 expected).

Although it was very challenging for the data collection teams to reach certain facilities, they were able to visit 227 of the sampled 229 facilities within eight weeks. The two facilities that were not visited were in the Maï-Ndombe province. They were dropped from the sample because it was discovered that they had been miscategorized as TB facilities and therefore were not eligible for the QTSA/DQR.

Once the data were captured electronically, field supervisors performed initial checks for data quality and completion, then submitted the reviewed responses to the SurveyCTO server, where the data were further reviewed and cleaned by POSAF. Back-checking of a portion of patient and provider interviews was also conducted as a data quality assurance measure. More information about the data management processes is provided in Appendix A of the QTSA report**:** https://www.tbdiah.org/resources/publications/quality-of-tuberculosis-services-assessment-in-drc-report/

Data Cleaning and Analysis

After the completion of data cleaning, and the finalization and locking of the data set, the data analysis was performed using the Statistical Package for the Social Sciences (SPSS), and data tables were exported into Microsoft Excel.

The preliminary findings from the assessment were presented in Kinshasa in November 2022 at a data validation and consensus meeting that assembled POSAF staff, PNLT leadership, QTSA/DQR steering committee members, TB stakeholders, and two TB DIAH staff. The purpose of the meeting was to validate the study results and discuss key insights and recommendations to put forward as a result of the study. Feedback from stakeholders helped TB DIAH finalize the analysis.

Disaggregation of the variables in the DQR tool is reported in the Results section of this document. The recommendations from the data consensus meeting are presented in the Recommendations section of this report.

Representativeness

The area of estimation for the survey is the national level, that is, survey estimates are valid only at the national level. Survey indicators are presented in the report as disaggregated by region for the purposes of understanding geographic differences. However, regional level estimates should be interpreted with caution, and only national level estimates should be used for drawing conclusions and/or for planning.

Ethical Review

The study was conducted following approval by both the John Snow, Inc. (JSI) ethical committee and the School of Public Health of Kinshasa (Ecole de santé publique de Kinshasa) in the DRC.

Results

M&E Structure and Function

In nearly all facilities visited (94.3%), the responsibility of recording the delivery of services in a source document was clearly assigned to a staff member, who most often (70.6% of facilities) had received appropriate training. In 74.1 percent of facilities, a supervisor was charged with reviewing aggregate numbers before submitting data to the next level (Table 1).

Table 1. Responsibilities around data collection and reporting at the TB health facilities (N=227)

	Percentage			
	Yes	Often	Rarely	No
Is the responsibility for recording the delivery of services on source documents clearly assigned to the relevant staff?	94.3		3.9	1.8
Have staff responsible for data collection and compilation of reports received the appropriate training?	70.6	1.8	11.0	16.7
Is there designated supervisor for reviewing aggregated numbers prior to submission to the next level (e.g., health area, health zone, province, etc.)?	74.1		13.6	12.3

Indicator Definitions and Reporting Guidelines

Facilities were about evenly split between those who had a copy of the TB M&E framework and those who did not (46.1%). Among those who reported they did, only 27.6 percent of facilities were able to retrieve it (Table 2). For the *Programme anti-tuberculeux intégré aux soins de santé primaire* (PATI), however, 80 percent of facilities were able to show the PATI guideline to data collectors, and only 7.5 percent of facilities reported not having it (Table 2).

Table 2. Availability of national TB reporting guidelines(N=227)

	Percentage		
	Yes, observed	Yes, reported but not seen	No
Do you have a copy of the TB M&E framework?	27.6	26.3	46.1
Do you have a copy of the guidelines for TB data collection (PATI)?	80.3	12.3	7.5

Facilities reported having standard written definitions of the certain key TB indicators like TB cases notified (64.4% of facilities), number of DS-TB cases (51.1%), number of registered new or relapse individuals with TB with documented HIV status (46.7%), and number of HIV-positive new and relapse individuals with TB on ART during TB treatment (46.7%). Few facilities reported having standard written definitions for the number of DR-TB cases (20%), but most facilities visited did not provide services to people with DR-TB (Table 3).

Table 3. Existence or availability of standard written definitions of key TB indicators at the facilities visited (n=44)

Does the facility have standard written definitions of the following indicators?	Percentage		
	Yes	No	N/A
TB cases notified	64.4	35.6	
Number of DS-TB cases, i.e., bacteriologically confirmed and clinically diagnosed, includes new and relapses	51.1	48.9	
Number of DR-TB cases	20.0	66.7	13.3
Number of registered new and relapse individuals with TB with documented HIV status	46.7	51.1	2.2
Number of HIV-positive new and relapse individuals with TB on ART during TB treatment	46.7	51.1	2.2

Very few facilities reported having an electronic manual that contains guidelines on reporting protocols to the District Health Information Software (DHIS2) (<7%, N=227) due to most facilities not reporting data electronically (see section on quarterly reporting below).

Facilities often had clear instructions on how to complete the data collection and reporting forms/tools have been provided (70.6%) but otherwise rarely had any other written guideline available on what they are expected to report on, how reports are to be submitted, to whom, and when (Table 4).

Table 4. Existence or availability of written guidelines on reporting protocols at the health facility

Are there written guidelines available at the facility on electronic or paper-based reporting protocols which include the following?	Percentage			
	Yes	Mostly	Partly	Not at all
What they are supposed to report on (n=44)	28.9	11.1	11.1	48.9
How (e.g., in what specific format) reports are to be submitted (n=44)	28.9	13.3	6.7	51.1
To whom the reports should be submitted (n=44)	35.6	11.1	6.7	46.7
When the reports are due (n=44)	35.6	11.1	4.4	48.9
Clear instructions on how to complete the data collection and reporting forms/tools have been provided (N=227)	70.6	8.8	13.2	7.5

Data Collection Tools

Table 5 below presents the full list of data collection tools, and whether they were observed by data collectors, factors associated with usability of the tools, and completeness over the last 12 months. The data collection tools most often observed at the facilities were the TB register (94.3%), the TB laboratory register (93.8%), the patient treatment cards (64.8%), and ART cohort registers were seen in more than half of facilities (52.9%). The large majority of registers, if encountered, were standardized (>97.4% with only the electronic patient record system

standardized in 75% of facilities) and up to date (>69.2%), and stockouts for registers rarely surpassed 10 percent of cases. Furthermore, on the whole, registers were complete and available for the last 12 months (>59%) (Table 5).

Appendix A presents the same data as Table 5 for each of the six provinces visited.

Table 5. Data collection tool observation, usability, and completeness for the overall study sample

		Percentage									
		Observation				Usability			Complete and available last 12 months		
Data collection tools	n=	Yes, observed	Yes, reported but not seen	No	N/A	Standardized	Up-to-date	Stockout	Yes	No	Partly
TB register	214	94.3	3.5	2.2	0	99.5	90.2	11.2	82.7	1.9	15.4
DR-TB register	38	16.7	5.3	65.6	12.3	97.4	76.3	7.9	65.8	10.5	23.7
MDR-TB register	19	8.4	4.0	74.0	13.7	100	84.2	5.3	73.7	15.8	10.5
TB laboratory register	213	93.8	4.0	2.2	0	99.5	94.8	11.3	84.0	0.5	15.5
Sample submission register	40	18.5	4.4	74.9	2.2	97.5	70.0	7.5	70.0	15.0	15.0
Xpert TB register	12	5.7	4.8	76.7	12.8	100	83.3	8.3	66.7	8.3	25.0
Contact cases register	39	17.2	6.2	74.9	1.8	97.4	69.2	2.6	59.0	10.3	30.8
Tuberculosis preventive treatment (TPT) register	43	19.8	8.4	70.9	0.9	97.7	83.7	4.7	72.1	4.7	23.3
Isoniazid prophylaxis registry (pediatric)	94	41.4	8.8	48.9	0.9	100	70.2	6.4	68.1	6.4	25.5
ART cohort register	115	52.9	11.9	33.5	1.8	98.3	78.3	10.4	69.6	2.6	27.8
Patient treatment cards (TB treatment cards)	146	64.8	12.3	22.0	0.9	99.3	88.4	17.1	77.4	3.4	19.2
Electronic patient record system	4	1.8	0.9	73.1	24.2	75.0	100	0	75.0	0	25.0
DR-TB screening register and initiation to second line drug treatment	13	5.7	2.6	78.0	13.7	100	76.9	0	92.3	0	7.7
Pediatric sampling register	6	2.6	4.8	88.1	4.4	100	100	0	83.3	0	16.7
HIV screening register	85	37.4	20.3	40.1	2.2	97.6	84.7	8.2	76.5	2.4	21.2
Other	34	15.0	1.8	76.7	6.6	44.1	70.6	14.7	70.6	2.9	26.5

Quarterly Reporting

Virtually all facilities visited submit quarterly reports to the PNLT (98.7%, N=227) and do so using a paper-based system only (98.2%, n=224). Those who don't submit by paper-based system only do both paper-based and electronic (1.8%). Eighty-two percent of facilities reported no stockout of PNLT and health management information system (HMIS) forms in the last twelve months, and 17.8 percent did (n=224). Aside from the PNLT, facilities reported to other organizations but to a lesser (14%) extent (Table 6).

Table 6. Recipients other than the PNLT of facilities' quarterly report for TB indicators (N=227)

Recipient	Percentage
None other (i.e., only the PNLT)	86.0
Nongovernmental organization/Not for profit	11.8
Mission/Faith-based	2.2

Data Quality and Supervision

A majority of facilities reported having a routine and systematic process within the facility for checking the quality of compiled reports (57.5%), having supervisors routinely perform accuracy checks (70.6%), consistently checking summarized data (63.6%), and having supervisors routinely check the timeliness and completeness of data entry in facility registers (71.9%) (Table 7).

Table 7. Data quality practices at the health facilities (N=227)

	Percentage			
	Yes	Mostly (there is a system, but it is not routinely applied at the facility)	Partly (data quality is checked occasionally, but not systematically)	Not at all
Is there a routine and systematic process within the facility for checking the quality of compiled reports?	57.5	18.4	14.0	10.1
	Yes		Partly (checks are conducted, but not routinely)	Not at all
Are accuracy checks routinely conducted by the supervisor?	70.6		20.2	9.2
Are consistency checks of summarized data routinely conducted?	63.6		23.7	12.7
Are checks for timely entry and completeness of registers routinely, i.e., quarterly, conducted by the supervisor?	71.9		18.0	10.1

Forty-three percent of facilities had written documentation at the facility of the results of data quality controls (55.7% did not; N=227). Most facilities (50.4%) also reported not having a written policy or guidance document (e.g., standard operating procedure [SOP]) at the facility on when and how to conduct data quality checks (32% of facilities did, 9% had a guidance but not available to see the data of the assessment; N=227).

Most facilities (67.0%) reported receiving regular supervisory visits and having a documented visit focused on data quality in the last six months (71.8%) (Table 8).

Table 8. Supervisory visits at the health facility (N=227)

	Percentage		
	Yes	Partly (there are supervisory visits, but they are not routine or documented)	Not at all
Does the facility receive regular supervisory visits (i.e., at least quarterly) from the province/zonal level (or higher)?	66.7	23.2	10.1
Has a documented supervisory visit focused on data quality been conducted at the facility in the past 6 months?	71.5	14.5	14.0

All data quality and supervision indicator data are provided disaggregated by province in Appendix B.

Data Maintenance and Confidentiality

In most facilities (83.8%; N=227), archived registers are organized such that records are easily retrievable. In a majority of facilities (61%) the access to archived registers is limited to the appropriate staff (e.g., the storage area can be locked, or electronic records accessible only to designated staff), and facilities on the most part had an appropriate (i.e., clean, dry) space for the secure organization and storage of source documents and reports (Table 9). Sixty-three percent of facilities (N=227) reported having relevant personal data maintained according to national or international confidentiality guidelines (e.g., in a locked cabinet).

Only four facilities reported having/using a computerized system, and in only one facility were there clearly documented and actively implemented database administration procedures (including access control and backup/recovery procedures) (Table 9).Of those four, two had the latest date of back-up appropriate given the frequency of update of the computerized system (e.g., back-ups are weekly or monthly) and two facilities had a computerized system that was password protected.

Table 9. Data maintenance and confidentiality at health facilities

	Percentage			
	Yes	Mostly (the space is clean, but not big enough)	Partly (the space is big enough, but not clean)	Not at all
Is there appropriate (i.e., clean, dry) and adequate space (sufficient size) for the secure organization and storage of source documents and reports? (N=227)	45.2	21.9	12.3	20.6
	Yes	Partly (access is limited, but not all the time)	Not at all	
Is access to archived registers limited to the appropriate staff (e.g., the storage area can be locked, or electronic records accessible only to designated staff)? (N=227)	61.0	25.9	13.2	
	Yes (the procedure is documented and actively implemented)	Mostly (there is a procedure, but it is not documented)	Partly (there is a procedure, but it is not followed routinely)	Not at all
For computerized systems, is there a clearly documented and actively implemented database administration procedure in place? (This includes access control and backup/recovery procedures.) (n=4)	25.0	25.0	25.0	25.0

Data Verification

Most facilities use the TB register as the source document for quarterly reporting of notified DS-TB cases (78.5%), while some facilities use the TB laboratory register (16.7%). In most cases, the DS-TB register was available for the review period (71.5%), but in over 22 percent of facilities it was available but only partially complete (Table 10). The quarterly report for the review period was available in 76.8 percent of facilities and was complete in 73.7 percent of facilities (Table 10).

Table 10. Source documents and their availability for DS-TB reporting and data verification (N=227)

	Percentage			
	TB register	**TB laboratory register**	**Patient cards (TB treatment cards)**	**Electronic patient record system**
What is the source document used by this facility for quarterly reporting of notified DS-TB cases?	78.5	16.7	1.3	3.5
	Available and complete	**Available but partly complete**	**Available but no data recorded**	**Not available**
DS-TB register for the period of January to March 2021 is available	71.5	22.4	0.9	5.3
Quarterly report available for Quarter 1 2021 (January to March 2021)	73.7	3.1	2.2	4.8

Drug-susceptible TB

The DS-TB VF was 1.02, or 102 percent, with 73.7 percent of facilities with a VF between 90 and 110 percent (Table 11).

Table 11. Variance of the VF for DS-TB (n=167)

DS-TB VF	1.02
Facilities with DS-TB VF	**Percentage**
Between 90% and 110%	73.7
Less than 90%	19.8
Greater than 110%	6.6
With perfect match between recounted and reported	40.2

The reasons for the discrepancies found for DS-TB were mainly due to incorrect information found in the registers (43.8%) and arithmetic errors (31.4%), or other undisclosed reasons (33.3%). Data entry errors were the cause for discrepancy in 17.1 percent of cases (Table 12).

Table 12. DS-TB VF reasons for discrepancy (n=105)

DS-TB VF: Reasons for discrepancy	Percentage
Data entry errors	17.1
Arithmetic errors	31.4
Information from all source documents not compiled correctly	43.8
Source document and/or quarterly report not available	3.8
Other	33.3

In the DS-TB register, errors were mostly around treatment outcome (22%), laboratory results (19%), and the type of patient and medical history of the patient (11%). About 33 percent of DS-TB cases reviewed for the DQR period had missing data elements from the register (Table 13).

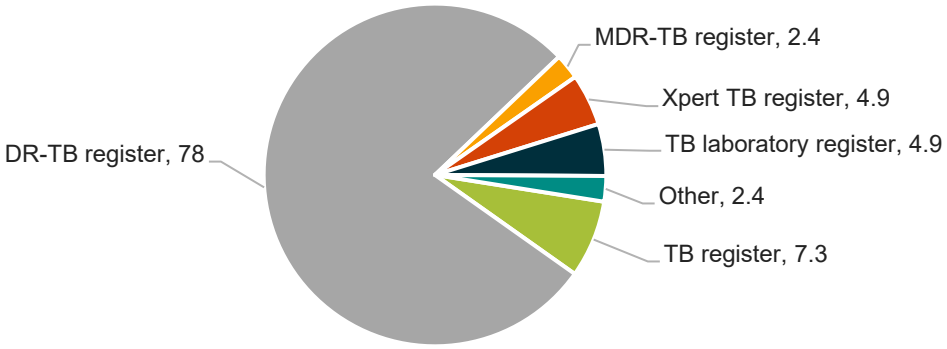
Table 13. Missing data elements from the DS-TB register (n=27)

Missing data elements	Percentage
Year of registration	4
Sex	2
Age	2
Disease classification/Anatomical site of disease	3
Type of patient/History of previous TB treatment/Patient registration group	11
Laboratory results	19
Treatment outcomes	22
Number of cases missing data in at least 1 of the 7 rows listed above	33

Drug-resistant TB

The DR-TB VF was 100 percent (n=13). The source document used by facilities for quarterly reporting of DR-TB cases was the DR-TB register in 78 percent of facilities, or the TB register in 7.3 percent of facilities. Five percent of facilities reported using the Xpert TB register or the TB laboratory register, and 2.4 percent of facilities used the MDR-TB register or another register (Figure 2).

Figure 2. Source document used by facility for quarterly reporting of notified DR-TB cases (n=41)



The DR-TB register was available and complete for the review period in 71.5 percent of facilities, and available and partly complete in 22.4 percent of facilities. In only 5.3 percent of facilities was the DR-TB register not available for the review period. Quarterly reports were most often unavailable(53.7%) or available and complete (41.5%) (Table 14).

Table 14. Availability of the DR-TB register and quarterly report for the January-March 2021 review period at health facilities providing DR-TB services (n=41)

	Percentage			
	Available and complete	Available but partly complete	Available but no data recorded	Not available
DR-TB register for the period of January to March 2021 is available and complete	71.5	22.4	0.9	5.3
Quarterly report available and complete for Quarter 1 2021 (January to March 2021)	41.5	2.4	2.4	53.7

The reasons for the discrepancy in the DR-TB VF were mostly categorized as "other" (54.5%), and otherwise related to arithmetic errors or the source document or quarterly report being unavailable in 18 percent of cases (Table 15).

Table 15. DR-TB VF reasons for discrepancy (n=41)

DR-TB VF: Reasons for discrepancy	Percentage
Data entry errors	9.1
Arithmetic errors	18.2
Information from all source documents not compiled correctly	0
Source document and/or quarterly report not available	18.2
Other	54.5

In the DR-TB register, errors were mostly around the laboratory results (31%), the type of patient and medical history of the patient (30%), and treatment outcome (21%). About 40 percent of DR-TB cases reviewed for the DQR period had missing data elements from the register (Table 16).

Table 16. Missing data elements from the DR-TB register (n=41)

Missing data elements	Percentage
Year of registration	0
Sex	0
Age	0
Disease classification/Anatomical site of disease	0
Type of patient/History of previous TB treatment/Patient registration group	30
Laboratory results	31
Treatment outcomes	21
Number of cases missing data in at least 1 of the 7 rows listed above	40

Discussion and Recommendations

Discussion

The TB DQR in the DRC revealed some strengths in the data quality, collection, and reporting systems including the fact that most facilities have staff assigned to data reporting roles (94.3%) who receive appropriate training (70.6%) and supervision (74.1%). A majority of facilities reported having a routine and systematic process for checking the quality of compiled reports (57.5%), having supervisors routinely perform accuracy checks (70.6%), consistently checking summarized data (63.6%), and having supervisors routinely check the timeliness and completeness of data entry in facility registers (71.9%). Facilities on the whole had the TB register and TB laboratory register available (94%), complete, and with few stockouts. A majority of facilities (66.7%) reported receiving regular supervisory visits and having a documented visit focused on data quality in the last six months (71.5%).

However, important gaps were highlighted by the findings, namely the availability of some source documents. While the PATI[2] was widely available (80%), the TB M&E framework was only available at half of sites (53.9%), and facilities reported having standard written definitions for key indicators only half of the time (46.7% to 64.4% for different indicators). Facilities often had clear instructions on how to complete the data collection and reporting forms/tools have been provided (70.6%) but otherwise rarely had any other written guideline available on what they are expected to report on, how reports are to be submitted, to whom, and when. Only half of facilities (55.7%) had written documentation at the facility of the results of data quality controls and most (50.4%) reported not having a written policy or guidance document (e.g., SOP) at the facility on when and how to conduct data quality checks. Very few facilities reported having an electronic manual that contains guidelines on reporting protocols to DHIS2 (<7%, N=227) due to most facilities not reporting data electronically.

When it comes to data verification, the DRC DQR revealed high-quality data for DS-TB reporting. Data verification showed extremely high congruence between the validated and reported results for DS-TB cases notified (VF=102%). Errors were due to incorrect information and arithmetic errors in more than a third of cases, and a third of facilities had DS-TB cases reviewed for the DQR period with missing data elements from the register.

The DQR likewise revealed high-quality data for DR-TB reporting. Data verification showed perfect congruence between the validated and reported results for DR-TB cases notified (VF=100%). The DR-TB register was available and complete for the review period in 71.5 percent of facilities assessed for the DR-TB VF (n=41), but quarterly reports were most often unavailable (53.7%). The percentage of missing data for tracer TB data elements was 40 percent for DR-TB. In 22 percent of cases, there was missing data on treatment outcomes, which is

[2] The PATI is the PNLT's guide of care for people with TB. It is a comprehensive document that describes TB (definition, transmission mode, risk factors, TB disease vs active TB, TB drug resistance, TB/HIV, pediatric TB), TB case definitions, TB screening and diagnosis, TB/HIV coinfection, TB treatment for different types of TB and patients, side effects, nutritional support, community involvement, implications for care providers, infection prevention and control, care of vulnerable populations, the DRC HMIS, supervision, and evaluation of efforts to fight against TB. The PATI version 5 is available at https://www.tbdiah.org/resources/publications/guide-de-prise-en-charge-de-la-tuberculose-pati-5/

particularly important for people with DR-TB. Data entry errors were classified as "other" in 54 percent of cases, which is something to further examine in future research.

Successes, challenges, and limitations are further discussed in the QTSA report: https://www.tbdiah.org/resources/publications/quality-of-tuberculosis-services-assessment-in-drc-report/

Recommendations

In November 2022, TB DIAH and POSAF jointly organized a data validation and consensus meeting with the PNLT and other TB stakeholders in the DRC, during which the preliminary results of the QTSA/DQR were presented, followed by the joint establishment of key recommendations.

The principal recommendation derived from the DQR data was related to TB data reporting. TB registers are not available across many facilities and there is widespread lack of standardization in the way the data collection and reporting tools are used. These tools also require frequent updating to continue to be in line with the indicators that the country is expected to report as stipulated by global guidance (e.g., WHO). Although the tools may be updated at the central level, it is important to note that a discrepancy exists between what is available at the central level and what is actually being used in the field, including how recently the registers, guidelines, and other data collection and reporting material used in the field were updated. The recommendation is to standardize and streamline the use of TB data collection and reporting tools by training facility personnel on their proper use, making the tools readily available, developing tools that can stay in a decent physical condition over the course of their use, and re-equipping facilities with up-to-date information and copies of registers and reporting forms when the tools undergo modifications.

Other recommendations based on data from the DQR include:

- Provide in-service and refresher training to facility staff working on data collection and reporting around common errors made on the registers such as arithmetic errors, and missing data elements to improve the reliability and completeness of reported data. Site visits and on-the-job training should be opportunities to provide feedback to facility staff on their data collection and reporting practices.
- Provide more guidance and support (including community support) for the follow-up of people with DR-TB so they complete their treatment and to minimize data gaps when it comes to treatment outcomes. Train staff on the proper timeline and steps to follow in the recording of treatment outcomes for all individuals with TB.
- The PNLT should disseminate the TB M&E framework more widely and provide updated versions when the framework is modified. There should also be more widespread availability and reference to standard written definitions for key TB indicators at health facilities.
- With the effort to increase Internet access and connectivity throughout the DRC, equipping facilities with the appropriate hardware and computer skills to be able to electronically review, report, and submit data will be a crucial step towards improving data transmission and use.

- Ensure availability of the DR-TB report at DR-TB sites.
- Facilities should receive more support and guidance on when and how to conduct data quality checks as well as be provided with more detailed reporting instructions that they would have available to consult during data collection and reporting activities.

Conclusion

The DQR conducted in the DRC provides valuable insights into the state of TB service delivery, data quality, and reporting systems in the country. These assessments are crucial for evaluating the effectiveness of TB programs and identifying areas for improvement.

The findings of the DQR highlight several strengths in the TB data collection and reporting systems in the DRC. Most notably, a majority of health facilities have staff dedicated to data reporting roles, receive appropriate training, and undergo regular supervision. Additionally, there is a systematic process for checking the quality of compiled reports, which contributes to data accuracy.

However, there are significant gaps and challenges that need to be addressed. One of the key recommendations is to standardize and streamline the use of TB data collection and reporting tools. Many facilities lack essential source documents, and the availability of standard written definitions for key TB indicators is inconsistent. Providing in-service training to address common errors in data recording and reporting is essential to improve data reliability and completeness. For both DS-TB and DR-TB reporting, discrepancies in data, often attributed to incorrect information in registers, arithmetic errors, and missing data elements related to treatment outcomes point to areas that require attention and are critical for monitoring patient progress.

The overarching goal of the recommendations issued around training, tool standardization, and data quality guidance is to improve the data reporting capabilities of the PNLT, strengthen the TB data reporting system, enhance data accuracy and completeness, and ultimately contribute to more effective TB management and patient care. The system will hopefully adapt to more digital and electronic data collection, reporting, and review mechanisms in the next decade. By addressing the identified challenges and building on the existing strengths, the DRC can further its commitment to combatting TB and achieving better health outcomes for its population.

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Appendix A. Data collection tool availability, usability, and completeness by province

Table A1. Data collection tool availability, usability, and completeness for the six provinces of the DQR

	Availability					Standardization		Up-to-date		Stockout		Complete for last 12mos.			
	Percentage (%)					%		%		%		%			
	Yes, observed	Yes, reported but not seen	No	N/A	Num	Yes	Num	Yes	Num	Yes	Num	Yes	No	Partl	Num
Haut-Uélé															
TB register	93.5	0	6.5	0	31	100	29	96.6	29	6.9	29	86.2	0	13.8	29
DR-TB register	6.5	0	58.1	35.5	31	100	2	100	2	0	2	50	0	50	2
MDR-TB register	0	0	61.3	38.7	31										
TB laboratory register	100	0	0	0	31	96.8	31	100	31	6.5	31	90.3	0	9.7	31
Sample submission register	9.7	6.5	80.6	3.2	31	100	3	100	3	0	3	100	0	0	3
Xpert TB register	3.2	6.5	51.6	38.7	31	100	1	100	1	0	1	100	0	0	1
Contact cases register	16.1	9.7	71	3.2	31	100	5	100	5	0	5	100	0	0	5
TPT register	9.7	12.9	77.4	0	31	100	3	100	3	0	3	100	0	0	3
Isoniazid prophylaxis registry (pediatric)	41.9	3.2	54.8	0	31	100	13	92.3	13	7.7	13	84.6	0	15.4	13
ART cohort register	61.3	6.5	32.3	0	31	93.8	16	100	16	12.5	16	87.5	0	12.5	16
Patient treatment cards (TB treatment cards)	22.6	29.0	48.4	0	31	100	6	100	6	0	6	100	0	0	6
Electronic patient record system	3.2	3.2	67.7	25.8	31	0	1	100	1	0	1	100	0	0	1
DR-TB screening register and initiation to second line drug treatment	0	0	74.2	25.8	31										
Pediatric sampling register	3.2	12.9	80.6	3.2	31	100	1	100	1	0	1	100	0	0	1
HIV screening register	25.8	29.0	45.2	0	31	100	8	100	8	0	8	100	0	0	8
Other	29.0	0	67.7	3.2	31	55.6	9	88.9	9	11.1	9	66.7	0	33.3	9
Kasaï-Oriental															
TB register	95.2	4.8	0	0	62	100	59	86.4	59	11.9	59	88.1	1.7	10.2	59
DR-TB register	37.1	6.5	54.8	1.6	62	100	23	91.3	23	8.7	23	82.6	4.3	13.0	23
MDR-TB register	22.6	4.8	71.0	1.6	62	100	14	92.9	14	7.1	14	92.9	7.1	0	14

	Availability					Standardization		Up-to-date		Stockout		Complete for last 12mos.			
	Percentage (%)					%		%		%		%			
	Yes, observed	Yes, reported but not seen	No	N/A	Num	Yes	Num	Yes	Num	Yes	Num	Yes	No	Partl	Num
TB laboratory register	91.9	8.1	0	0	62	100	57	94.7	57	12.3	57	94.7	1.8	3.5	57
Sample submission register	33.9	4.8	58.1	3.2	62	95.2	21	90.5	21	14.3	21	85.7	4.8	9.5	21
Xpert TB register	9.7	4.8	79.0	6.5	62	100	5	100	5	0	5	80.0	0	20.0	5
Contact cases register	41.9	11.3	46.8	0	62	100	26	65.4	26	0	26	61.5	7.7	30.8	26
TPT register	30.6	6.5	62.9	0	62	100	19	100	19	0	19	84.2	0	15.8	19
Isoniazid prophylaxis registry (pediatric)	51.6	12.9	35.5	0	62	100	32	81.3	32	6.3	32	68.8	6.3	25.0	32
ART cohort register	51.6	17.7	30.6	0	62	96.9	32	71.9	32	6.3	32	62.5	3.1	34.4	32
Patient treatment cards (TB treatment cards)	59.7	14.5	22.6	3.2	62	100	37	89.2	37	8.1	37	91.9	0	8.1	37
Electronic patient record system	3.2	1.6	58.1	37.1	62	100	2	100	2	0	2	100	0	0	2
DR-TB screening register and initiation to second line drug treatment	16.1	9.7	64.5	9.7	62	100	10	80	10	0	10	100	0	0	10
Pediatric sampling register	6.5	9.7	77.4	6.5	62	100	4	100	4	0	4	100	0	0	4
HIV screening register	45.2	22.6	30.6	1.6	62	100	28	85.7	28	3.6	28	75.0	3.6	21.4	28
Other	12.9	0	74.2	12.9	62	100	8	37.5	8	25.0	8	50.0	0	50.0	8
Lualaba															
TB register	97.2	2.8	0	0	36	100	35	94.3	35	14.3	35	54.3	0	45.7	35
DR-TB register	13.9	11.1	66.7	8.3	36	100	5	20.0	5	0	5	0	40.0	60.0	5
MDR-TB register	11.1	11.1	66.7	11.1	36	100	4	50.0	4	0	4	0	50.0	50.0	4
TB laboratory register	97.2	0	2.8	0	36	100	35	97.1	35	14.3	35	54.3	0	45.7	35
Sample submission register	16.7	11.1	72.2	0	36	100	6	50.0	6	0	6	33.3	33.3	33.3	6
Xpert TB register	8.3	8.3	80.6	2.8	36	100	3	66.7	3	0	3	0	33.3	66.7	3
Contact cases register	19.4	11.1	66.7	2.8	36	85.7	7	57.1	7	14.3	7	14.3	28.6	57.1	7
TPT register	27.8	19.4	52.8	0	36	100	10	70.0	10	10.0	10	30.0	10.0	60.0	10
Isoniazid prophylaxis registry (pediatric)	33.3	13.9	52.8	0	36	100	12	66.7	12	0	12	25.0	16.7	58.3	12
ART cohort register	47.2	11.1	38.9	2.8	36	100	17	76.5	17	17.6	17	29.4	5.9	64.7	17
Patient treatment cards (TB treatment cards)	80.6	5.6	13.9	0	36	100	29	96.6	29	17.2	29	65.5	3.4	31.0	29

	Availability					Standardization		Up-to-date		Stockout		Complete for last 12mos.			
	Percentage (%)					%		%		%		%			
	Yes, observed	Yes, reported but not seen	No	N/A	Num	Yes	Num	Yes	Num	Yes	Num	Yes	No	Partl	Num
Electronic patient record system	2.8	0	83.3	13.9	36	100	1	100	1	0	1	0	0	100	1
DR-TB screening register and initiation to second line drug treatment	2.8	0	88.9	8.3	36	100	1	100	1	0	1	0	0	100	1
Pediatric sampling register	2.8	0	94.4	2.8	36	100	1	100	1	0	1	0	0	100	1
HIV screening register	44.4	27.8	25.0	2.8	36	100	16	87.5	16	18.8	16	43.8	6.3	50.0	16
Other	2.8	2.8	86.1	8.3	36	0	1	100	1	100	1	0	0	100	1
Maï-Ndombe															
TB register	87.5	12.5	0	0	24	100	21	95.2	21	0	21	100	0	0	21
DR-TB register	12.5	0	75.0	12.5	24	100	3	66.7	3	0	3	33.3	33.3	33.3	3
MDR-TB register	4.2	0	83.3	12.5	24	100	1	100	1	0	1	100	0	0	1
TB laboratory register	87.5	12.5	0	0	24	100	21	90.5	21	4.8	21	95.2	0	4.8	21
Sample submission register	0	0	100	0	24										
Xpert TB register	4.2	0	83.3	12.5	24	100	1	0	1	0	1	100	0	0	1
Contact cases register	0	0	100	0	24										
TPT register	12.5	0	87.5	0	24	100	3	66.7	3	0	3	100	0	0	3
Isoniazid prophylaxis registry (pediatric)	33.3	12.5	54.2	0	24	100	8	25.0	8	0	8	25.0	12.5	62.5	8
ART cohort register	41.7	12.5	33.3	12.5	24	100	9	55.6	9	0	9	55.6	11.1	33.3	9
Patient treatment cards (TB treatment cards)	79.2	20.8	0	0	24	100	19	84.2	19	5.3	19	57.9	0	42.1	19
Electronic patient record system	0	0	41.7	58.3	24										
DR-TB screening register and initiation to second line drug treatment	0	0	79.2	20.8	24										
Pediatric sampling register	0	0	95.8	4.2	24										
HIV screening register	37.5	12.5	37.5	12.5	24	100	9	66.7	9	0	9	55.6	0	44.4	9
Other	54.2	4.2	37.5	4.2	24	15.4	13	76.9	13	7.7	13	84.6	7.7	7.7	13
Maniema															
TB register	97.4	2.6	0	0	39	97.4	38	78.9	38	15.8	38	84.2	7.9	7.9	38
DR-TB register	7.7	5.2	64.1	23.1	39	97.4	3	66.7	3	0	3	100	0	0	3

	Availability					Standardization		Up-to-date		Stockout		Complete for last 12mos.			
	Percentage (%)					%		%		%		%			
	Yes, observed	Yes, reported but not seen	No	N/A	Num	Yes	Num	Yes	Num	Yes	Num	Yes	No	Partly	Num
MDR-TB register	0	2.6	71.8	25.6	39										
TB laboratory register	92.3	2.6	5.1	0	39	100	36	86.1	36	11.1	36	83.3	0	16.7	36
Sample submission register	2.6	2.6	89.7	5.1	39	100	1	0	1	0	1	100	0	0	1
Xpert TB register	5.1	7.7	66.7	20.5	39	100	2	100	2	50.0	2	100	0	0	2
Contact cases register	0	0	94.9	5.1	39										
TPT register	2.6	7.7	84.6	5.1	39	100	1	100	1	0	1	100	0	0	1
Isoniazid prophylaxis registry (pediatric)	43.6	5.1	46.2	5.1	39	100	17	64.7	17	5.9	17	88.2	0	11.8	17
ART cohort register	71.8	12.8	15.4	0	39	100	27	74.1	27	7.4	27	81.5	0	18.5	27
Patient treatment cards (TB treatment cards)	79.5	5.1	15.4	0	39	100	31	83.9	31	32.3	31	71.0	9.7	19.4	31
Electronic patient record system	0	0	87.2	12.8	39										
DR-TB screening register and initiation to second line drug treatment	2.6	0	74.4	23.1	39	100	1	0	1	0	1	100	0	0	1
Pediatric sampling register	0	0	92.3	7.7	39										
HIV screening register	28.2	25.6	46.2	0	39	90.9	11	63.6	11	0	11	100	0	0	11
Other	5.1	2.6	89.7	2.6	39	0	2	100	2	0	2	100	0	0	2
Sud-Ubangi															
TB register	91.4	0	8.6	0	35	100	32	96.9	32	12.5	32	87.5	0	12.5	32
DR-TB register	5.7	5.7	85.7	2.9	35	100	2	50.0	2	50.0	2	50.0	0	50.0	2
MDR-TB register	0	2.9	94.3	2.9	35										
TB laboratory register	94.3	0	5.7	0	35	100	33	100	33	15.2	33	84.8	0	15.2	33
Sample submission register	25.7	0	74.3	0	35	100	9	33.3	9	0	9	44.4	33.3	22.2	9
Xpert TB register	0	0	97.1	2.9	35										
Contact cases register	2.9	0	97.1	0	35	100	1	100	1	0	1	100	0	0	1
TPT register	25.7	2.9	71.4	0	35	85.7	7	57.1	7	14.3	7	71.4	14.3	14.3	7
Isoniazid prophylaxis registry (pediatric)	34.3	2.9	62.9	0	35	100	12	58.3	12	16.7	12	91.7	8.3	0	12
ART cohort register	40.0	2.9	57.1	0	35	100	14	92.9	14	21.4	14	100	0	0	14

	Availability					Standardization		Up-to-date		Stockout		Complete for last 12mos.			
	Percentage (%)					%		%		%		%			
	Yes, observed	Yes, reported but not seen	No	N/A	Num	Yes	Num	Yes	Num	Yes	Num	Yes	No	Partly	Num
Patient treatment cards (TB treatment cards)	68.6	2.9	28.6	0	35	95.8	24	83.3	24	25.0	24	87.5	4.2	8.3	24
Electronic patient record system	0	0	100	0	35										
DR-TB screening register and initiation to second line drug treatment	2.9	0	97.1	0	35	100	1	100	1	0	1	100	0	0	1
Pediatric sampling register	0	2.9	97.1	0	35										
HIV screening register	37.1	0	62.9	0	35	92.3	13	100	13	23.1	13	100	0	0	13
Other	2.9	2.9	91.4	2.9	35	0	1	0	1	0	1	100	0	0	1

Appendix B. Data quality and supervision indicators by province

Table B1. Presence of a routine and systematic process within the facility for checking the quality of compiled reports (N=227)

Province		Not at all	Yes	Mostly (there is a system but it is not routinely applied athe facility)	Partly (datuality is checked osionally, but not systatically)	Total
Haut-Uélé	Count	1	28	2	0	31
	%	3.2	90.3	6.5	0	
Kasaï-Oriental	Count	1	43	12	6	62
	%	1.6	69.4	19.4	9.7	
Lualaba	Count	1	26	5	4	36
	%	2.8	72.2	13.9	11.1	
Maï-Ndombe	Count	10	5	4	5	24
	%	41.7	20.8	16.7	20.8	
Maniema	Count	9	19	3	8	39
	%	23.1	48.7	7.7	20.5	
Sud Ubangi	Count	1	10	16	8	35
	%	2.9	28.6	45.7	22.9	

Table B2. Assessment of accuracy checks being routinely conducted by the supervisor every quarter (N=227)

Province		Not at all	Yes	Partly (accuracy checks are conducted, butot routinely)	Total
Haut-Uélé	Count	1	28	2	31
	%	3.2	90.3	6.5	
Kasaï-Oriental	Count	1	56	5	62
	%	1.6	90.3	8.1	
Lualaba	Count	1	31	4	36
	%	2.8	86.1	11.1	

Province		Not at all	Yes	Partly (accuracy checks are conducted, butot routinely)	Total
Maï-Ndombe	Count	10	3	11	24
	%	41.7	12.5	45.8	
Maniema	Count	4	25	10	39
	%	10.3	64.1	25.6	
Sud Ubangi	Count	4	18	13	35
	%	11.4	51.4	37.1	

Table B3. Assessment of consistency checks of summarized data being routinely conducted (N=227)

Province		Not at all	Yes	Partly (consistency checks are conducted, but nt routinely)	Total
Haut-Uélé	Count	1	26	4	31
	%	3.2	83.9	12.9	
Kasaï-Oriental	Count	1	50	11	62
	%	1.6	80.6	17.7	
Lualaba	Count	1	29	6	36
	%	2.8	80.6	17.7	
Maï-Ndombe	Count	17	2	5	24
	%	70.8	8.3	20.8	
Maniema	Count	4	26	9	39
	%	10.3	66.7	23.1	
Sud Ubangi	Count	5	12	18	35
	%	14.3	34.3	51.4	

Table B4. Assessment of checks for timely entry and completeness of registers being routinely conducted by the supervisor every quarter (N=227)

Province		Not at all	Yes	Partly (checks for timely entry and completenre conducted, but not routinely)	Total
Haut-Uélé	Count	1	29	1	31
	%	3.2	93.5	3.2	
Kasaï-Oriental	Count	1	58	3	62
	%	1.6	93.5	4.8	
Lualaba	Count	4	25	7	36
	%	11.1	69.4	19.4	
Maï-Ndombe	Count	9	6	9	24
	%	37.5	25.0	37.5	
Maniema	Count	4	27	8	39
	%	10.3	69.2	20.5	
Sud Ubangi	Count	3	19	13	35
	%	8.6	54.3	37.1	

Table B5. Presence of written documentation at the facility of the results of data quality controls (N=227)

Province		No	Yes	Don't know	Total
Haut-Uélé	Count	8	23	0	31
	%	25.8	74.2	0	
Kasaï-Oriental	Count	32	30	0	62
	%	51.6	48.4	0	
Lualaba	Count	16	19	1	36
	%	44.4	52.8	2.8	
Maï-Ndombe	Count	20	3	1	24
	%	83.3	12.5	4.2	
Maniema	Count	32	7	0	39

Province		No	Yes	Don't know	Total
	%	82.1	17.9	0	
Sud Ubangi	Count	18	16	1	35
	%	51.4	45.7	2.9	

Table B6. Presence of written policy or guidance document (e.g., SOP) at the facility on when and how to conduct data quality checks (N=227)

Province		Not at all	Yes	Mostly (there is guidance, but it is not available)	Partly (tere is guidance, but it isnformal)	Don't know	Total
Haut-Uélé	Count	7	22	1	1	0	31
	%	22.6	71.0	3.2	3.2	0	
Kasaï-Oriental	Count	25	24	4	9	0	62
	%	40.3	38.7	6.5	14.5	0	
Lualaba	Count	13	21	1	1	0	36
	%	36.1	58.3	2.8	2.8	0	
Maï-Ndombe	Count	21	1	1	1	0	24
	%	87.5	4.2	4.2	4.2	0	
Maniema	Count	35	2	0	1	1	39
	%	89.7	5.1	0	2.6	2.6	
Sud Ubangi	Count	13	5	14	3	0	35
	%	37.1	14.3	40.0	8.6	0	

Table B7. Facilities receiving regular supervisory visits (i.e., at least quarterly) from the province/zonal level (or higher) (N=227)

Province		Not at all	Yes	Partly (there are supervisory visits, but they arot routine)	Total
Haut-Uélé	Count	0	28	3	31
	%	0	90.3	9.7	
Kasaï-Oriental	Count	0	56	6	62

Province		Not at all	Yes	Partly (there are supervisory visits, but they arot routine)	Total
	%	0	90.3	9.7	
Lualaba	Count	3	23	10	36
	%	8.3	63.9	27.8	
Maï-Ndombe	Count	8	5	11	24
	%	33.3	20.8	45.8	
Maniema	Count	8	24	7	39
	%	20.5	61.5	17.9	
Sud Ubangi	Count	4	16	15	35
	%	11.4	45.7	42.9	

Table B8. Assessment of a documented supervisory visit focused on data quality has been conducted at the facility in the past six months (N=227)

Province		No	Yes	Partly (there was a visit but there is no supporting documntation)	Total
Haut-Uélé	Count	0	29	2	31
	%	0	93.5	6.5	
Kasaï-Oriental	Count	6	52	4	62
	%	9.7	83.9	6.5	
Lualaba	Count	4	26	6	36
	%	11.1	72.2	16.7	
Maï-Ndombe	Count	8	9	7	24
	%	33.3	37.5	29.2	
Maniema	Count	10	25	4	39
	%	25.6	64.1	10.3	
Sud Ubangi	Count	4	22	9	35
	%	11.4	62.9	25.7	

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