



Epidemiological surveillance actions for leprosy in Bahia: a cross-sectional study across health macro-regions

Ações de vigilância epidemiológica da hanseníase na Bahia: estudo transversal nas macrorregiões de saúde
Acciones de vigilancia epidemiológica de la lepra en Bahía: estudio transversal en las macrorregiones de salud

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ABSTRACT

Background and Objectives: Leprosy represents a major challenge for health managers and healthcare professionals. Epidemiological surveillance of leprosy involves several actions aimed at monitoring, early diagnosis, control, and prevention. The objective of this study was to analyze the leprosy surveillance actions developed in the State of Bahia, Brazil. **Methods:** This was a cross-sectional observational study. A quantitative questionnaire was applied to assess healthcare services, diagnostic and laboratory networks, treatment, and surveillance actions. The instrument was sent to regional health offices and forwarded to the epidemiological surveillance units of the municipalities. Data were analyzed using Microsoft Excel and SPSS version 26. **Results:** Of the 417 eligible municipalities, 367 responded to the questionnaire, corresponding to a response rate of 88%. Mandatory notification showed adherence above 95% across all health macro-regions. However, operational weaknesses persisted: 68.4% of municipalities reported using the registration and treatment control book; 52.6% reported sending follow-up bulletins to health units; and, in all macro-regions, fewer than 50% produced municipal epidemiological bulletins. These findings indicate consolidation of notification practices, but also weaknesses in longitudinal monitoring, SINAN data feedback, and local epidemiological information production. **Conclusions:** Epidemiological surveillance actions for leprosy are intrinsic to disease control and are essential for monitoring, comprehensive follow-up, and detailed investigation of all cases. In this context, the State Leprosy Control Program faces the challenge of strengthening these actions across health macro-regions in order to achieve the targets established by the Brazilian Ministry of Health and the World Health Organization.

Keywords: Health Surveillance. Epidemiological Surveillance. Leprosy. Primary Health Care. Health Information Systems. Disease Notification.

RESUMO

Justificativa e Objetivos: A hanseníase representa um grande desafio para gestores e profissionais de saúde. A vigilância epidemiológica da hanseníase envolve diversas ações para o monitoramento, diagnóstico precoce, controle e prevenção. O objetivo deste estudo foi analisar as ações de vigilância da hanseníase desenvolvidas no Estado da Bahia. **Método:** Estudo transversal observacional. Foi aplicado questionário quantitativo sobre assistência, rede de exames e diagnóstico, tratamento e ações de vigilância. O instrumento foi enviado às bases regionais de saúde e encaminhado à vigilância epidemiológica dos municípios. Os dados foram analisados no Microsoft Excel e SPSS v.26. **Resultados:** Dos 417 municípios elegíveis, 367 responderam ao questionário, correspondendo a uma taxa de resposta de 88%. A notificação compulsória apresentou adesão superior a 95% em todas as macrorregiões. Entretanto, persistiram fragilidades operacionais: 68,4% dos municípios referiram utilizar o livro de registro e controle de tratamento; 52,6% informaram enviar o boletim de acompanhamento às unidades de saúde; e, em todas as macrorregiões, menos de 50% elaboravam boletins epidemiológicos municipais. Os achados indicam consolidação da notificação, mas fragilidades no monitoramento longitudinal, na retroalimentação do SINAN e na produção local de informação epidemiológica. **Conclusões:** As ações de Vigilância Epidemiológica da hanseníase são intrínsecas ao controle da doença, sendo indispensáveis para o monitoramento, o acompanhamento integral e a investigação detalhada de todos os casos. Nesse sentido, o Programa Estadual da Hanseníase tem como desafio fortalecer as ações nas macrorregiões de saúde, com o objetivo de alcançar as metas traçadas pelo Ministério da Saúde e Organização Mundial da Saúde.

Descritores: Vigilância em Saúde. Vigilância Epidemiológica. Hanseníase. Atenção Primária à Saúde. Sistemas de Informação em Saúde. Notificação de Doenças.

RESUMEN

Justificación y Objetivos: La lepra representa un desafío para gestores y profesionales de la salud. Su vigilancia epidemiológica comprende acciones de monitoreo, diagnóstico precoz, control y prevención. El objetivo fue analizar las acciones de vigilancia de la lepra desarrolladas en el Estado de Bahía, Brasil. **Métodos:** Estudio observacional de corte transversal. Se aplicó un cuestionario cuantitativo sobre asistencia sanitaria, red de exámenes y diagnóstico, tratamiento y acciones de vigilancia. El instrumento fue enviado a las bases regionales de salud y remitido a las unidades municipales de vigilancia epidemiológica. Los datos fueron analizados en Microsoft Excel y SPSS v.26. **Resultados:** De los 417 municipios elegibles, 367 respondieron al cuestionario, con una tasa de respuesta del 88%. La notificación obligatoria presentó adhesión superior al 95% en todas las macrorregiones. Persistieron fragilidades operativas: 68,4% de los municipios informó utilizar el libro de registro y control del tratamiento; 52,6% reportó enviar boletines de seguimiento a las unidades de salud; y, en todas las macrorregiones, menos del 50% elaboraba boletines epidemiológicos municipales. Los hallazgos indican consolidación de la notificación, pero debilidades en el monitoreo longitudinal, la retroalimentación del SINAN y la producción local de información epidemiológica. **Conclusiones:** Las acciones de vigilancia epidemiológica son indispensables para el control de la lepra, el seguimiento integral y la investigación de los casos. El Programa Estatal de Control de la Lepra debe fortalecer estas acciones en las macrorregiones para alcanzar las metas del Ministerio de Salud de Brasil y de la Organización Mundial de la Salud.

Palabras Clave: Vigilancia en Salud. Vigilancia Epidemiológica. Lepra. Atención Primaria de Salud. Sistemas de Información en Salud. Notificación de Enfermedades.

INTRODUCTION

Leprosy is an infectious and contagious disease considered a serious public health problem in Brazil and is caused by the bacterium *Mycobacterium leprae*. The parasite characteristically infects skin macrophages and Schwann cells of the peripheral nervous system, which explains the neural involvement and the risk of physical disabilities when treatment is delayed.¹

The epidemiological situation in the country is concerning, as Brazil has the second-highest number of leprosy cases worldwide, behind only India. In 2023, the country recorded 182,815 new cases, representing a 5% increase compared with the previous year.² Bahia is a highly endemic state, ranking third among Brazilian federative units in 2022, with 1,668 new reported cases and an annual detection rate of 11.79 cases per 100,000 inhabitants.³

Given the severity of this situation, the Bahia State Leprosy Control Program emphasizes the importance of intensifying surveillance and control actions to achieve the targets established in the National Strategy for Tackling Leprosy 2024–2030.³ As a serious public health problem, the disease requires continuous epidemiological surveillance and coordination among the health care network, teaching and research institutions, and other organizations.⁴

Epidemiological surveillance is an essential component at all management levels of the health care network, as it ensures access to crucial information on the distribution, magnitude, and burden of a disease. Its activities encompass a continuous cycle of data collection, processing, analysis, interpretation, and feedback to health information systems. Surveillance makes it possible to identify disease patterns and profiles, detect trends within the territory, and monitor its distribution. In the context of leprosy, epidemiological surveillance also focuses on specific groups and activities, including contact tracing, surveillance of cases in children under 15 years of age, and monitoring of relapses and antimicrobial resistance.⁵

Strategic public health actions and epidemiological surveillance constitute fundamental pillars for achieving a sustainable reduction in leprosy and, consequently, meeting the disease elimination targets.⁶

In 2024, the Ministry of Health developed a document entitled the “National Strategy for Tackling Leprosy 2024–2030,” whose mission is “A Brazil without Leprosy” and whose targets are: interrupting transmission in 99% of municipalities; eliminating the disease in 75% of municipalities; reducing by 20% the absolute number of new cases with grade 2 physical disability (G2D) at the time of diagnosis; and addressing 100% of reports concerning discriminatory practices

related to leprosy registered with the ombudsman offices of the Brazilian Unified Health System.⁷

To date, no studies have been identified that specifically address the epidemiological surveillance of leprosy from this perspective, highlighting an important gap in the national and international scientific literature. Considering the epidemiological situation in the state and the targets established for reducing leprosy in the country, this study aimed to analyze the surveillance actions being implemented in the State of Bahia, thereby contributing to the planning of actions within the Bahia State Leprosy Control Program.

METHODS

This was a cross-sectional observational epidemiological study conducted in the State of Bahia, encompassing 417 municipalities and 9 health macro-regions.^{8,9} The target population comprised all municipalities in the state, characterizing a census-based sampling approach with voluntary participation.

All 417 municipalities in the State of Bahia were eligible, with the municipality defined as the unit of analysis. Municipalities that submitted a completed questionnaire during the data collection period were included, regardless of the position or professional background of the individual responsible for completing it. Municipalities that did not return the instrument were not included in the analysis. Thus, the final sample comprised 367 responding municipalities, corresponding to 88% of the eligible municipalities.

The study was approved by the Human Research Ethics Committee of the University of Guarulhos (Opinion No. 6872568). The ethical principles established by Resolution No. 466 of December 12, 2012, were observed in conducting the study. Circular Letter No. 2 of February 24, 2021, was also considered because the study involved the use of a virtual environment.^{10,11}

Participants were informed about the objectives of the study and the procedures for data collection. They were also informed that they could withdraw from the study at any time and that all information would be kept strictly confidential.

Important aspects of the epidemiological surveillance work process related to leprosy were assessed using a questionnaire comprising 17 questions addressing service characterization; examinations and diagnosis; and treatment and surveillance actions (Supplementary Material).

In addition to the structured questionnaire, an epidemiological analysis was conducted using secondary data from the Notifiable Diseases Information System (SINAN) for the year 2024, containing no patient-identifiable variables. The data were provided by the Bahia State Department of

Health / Directorate of Epidemiological Surveillance, the agency responsible for the State Leprosy Control Program, which operates under the direct authority of the Superintendency of Health Surveillance and Protection (SUvisa).

The questionnaires were sent to the Regional Health Bases (BRS), which were responsible for forwarding them to the municipalities. Data collection was conducted between June 3 and August 3, 2024. The municipal epidemiological surveillance technical coordinator or the technical professional designated as the leprosy focal point was responsible for completing the questionnaire.

The electronic form was sent by e-mail for distribution to the municipalities and completion. Before accessing the questionnaire, participants were provided with the Informed Consent Form.

As this was a descriptive and exploratory study, no bivariate or inferential analyses were performed. The data were organized in an electronic spreadsheet and analyzed using descriptive statistics, with calculation of absolute and relative frequencies. The data were presented in figures as graphs, allowing visual identification of weaknesses in epidemiological surveillance activities in Bahia, based on the 2024 Epidemiological Surveillance Guide of the Ministry of Health.

RESULTS

In the state, 367 municipalities (88%) participated in the study. Regarding participation within the regions, data were collected from 82.14% of the municipalities in the Northern region; 100% of the municipalities in the Northeastern region; 87.5% in the Eastern region; 89.39% in the Southern region; 95.23% in the Extreme Southern region; 72.97% of the municipalities in the Southwestern region; 86.11% in the Western region;

97.22% in the Central-Eastern region; and 89.47% of the municipalities in the Central-Northern region.

The main leprosy surveillance actions were analyzed to assess whether case monitoring, treatment, and follow-up were being effectively carried out across the health regions.

Bahia has historically presented new case detection rates considered indicative of high endemicity according to national parameters. In 2022, 1,668 new cases were reported, with a detection rate of 11.79 new cases/100,000 inhabitants. In 2023, 1,652 new leprosy cases were reported, representing a detection rate of 11.68 new cases/100,000 inhabitants. The occurrence of leprosy in children (56 cases in 2022 and 35 new cases in children under 15 years of age in 2023) indicates active transmission of the disease within the territory and represents an epidemiological warning sign. Despite this finding, some municipalities have reported no cases for 10 years or more (Dom Macedo Costa, Muniz Ferreira, Pedrão, Caatiba, Aiquara, Lafaiete Coutinho, and Taperoá).

Regarding mode of entry in 2023, 81.1% of the cases recorded in the State of Bahia were classified as “new cases”; 6.9% as “transfers”; 5.7% as “other readmissions”; and 5.6% as “relapses.” In the same year, among the 417 municipalities in the state, 64.7% reported new cases (n=270). Relapse cases occurred in 13.9% of the municipalities (n=58). Regarding physical disability, 15.3% of the municipalities (n=64) reported cases with grade 2 physical disability (G2D) at the time of diagnosis.

In the state, 68.4% of the participating municipalities reported using the treatment registration and monitoring book in health care units, 19.3% reported using it sometimes, and 12% reported not using this instrument. The distribution by health macro-region is presented below (Figure 1).

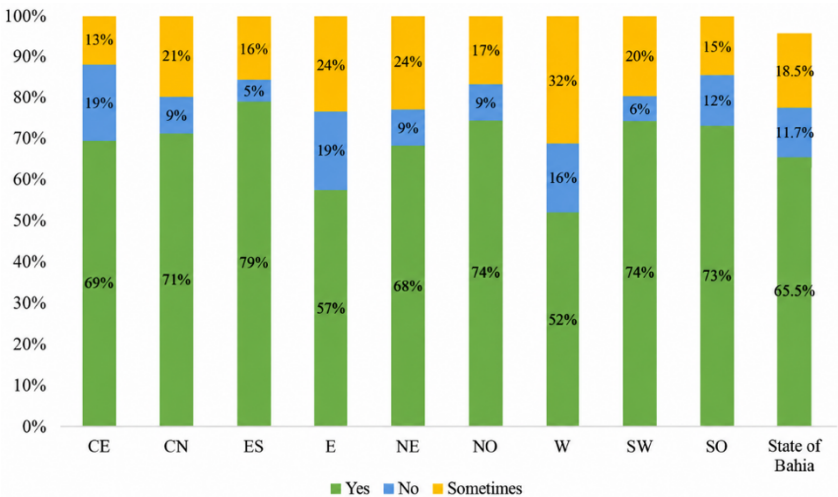


Figure 1. Percentage of municipalities that use the treatment registration and monitoring book in health care units, by health macro-region of Bahia, 2024.

Abbreviation: CE = Central-Eastern; CN = Central-Northern; ES = Extreme Southern; E = Eastern; NE = Northeastern; NO = Northern; W = Western; SW = Southwestern; SO = Southern.

In Bahia, 52.6% of the participating municipalities reported sending the Follow-up Bulletin to health care units for data updating. Among these municipalities, 6.2% reported sending it weekly, 53.9% monthly,

12.8% every six months, and 11.9% annually. The distribution by health macro-region is presented below (Figure 2).

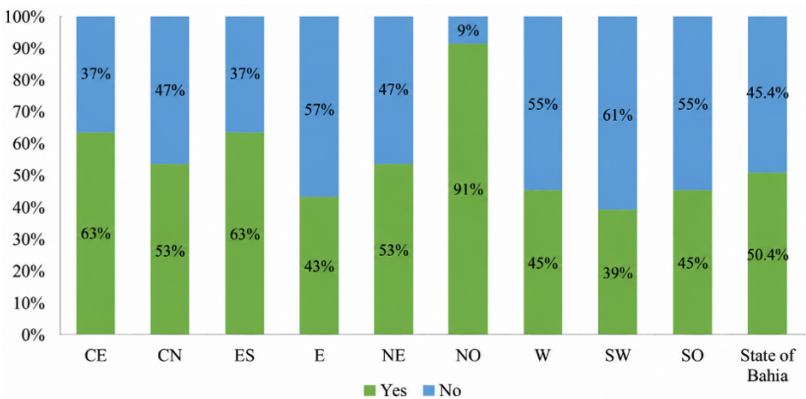


Figure 2. Percentage of municipalities that reported whether or not they send the Follow-up Bulletin to health care units for data updating, by health macro-region of Bahia, 2024.

Abbreviation: CE = Central-Eastern; CN = Central-Northern; ES = Extreme Southern; E = Eastern; NE = Northeastern; NO = Northern; W = Western; SW = Southwestern; SO = Southern.

In the Eastern region, 57% of municipalities reported not using the Follow-up Bulletin. Similarly, in the Western and Southern regions, 55% of municipalities in each region reported not using this instrument for monitoring and system feedback (Figure 2).

In the Extreme Southern region, a distinct pattern was observed compared with the other regions. In all of them, more than 50% of municipalities were not following the recommended frequency, limiting follow-up to an annual basis. This finding indicates lower adherence to the recommended follow-up frequency, directly affecting control of the transmission chain and the quality of care provided.

Regarding leprosy notification in the State of Bahia, the data demonstrate a high degree of compliance with current legislation and the guidelines of the Health Surveillance Guide. The notification routine is effectively established across all health macro-regions, with an adherence rate exceeding 95% in all regions (Figure 4). Notably, the Central-Eastern, Extreme Southern, Eastern, and Western regions achieved 100% municipal adherence, indicating that notification is a routine practice fully incorporated into the care of patients diagnosed with leprosy.

In addition, a defined flow for forwarding notifications was identified across the health regions. In the Extreme Southern, Northern, and Western regions, 100% of municipalities reported having a defined notification flow.

SINAN must be monitored by the epidemiological surveillance team until case closure, which is recorded in the Follow-up Bulletin by the health care team and forwarded to Epidemiological Surveillance. Patient outcomes may include discharge due to cure (established according to criteria related to treatment regularity, number of doses, and treatment duration),

treatment abandonment (absence for 3 months in paucibacillary cases or 6 months in multibacillary cases), death, or transfer.⁵

In addition to sending the Follow-up Bulletin and providing feedback to the system, epidemiological surveillance must monitor case closure. In the State of Bahia, this monitoring occurs in all health regions, with the Central-Northern, Extreme Southern, Northeastern, Northern, Western, and Southern regions reporting that 100% of municipalities ensure this follow-up.

In the Central-Eastern region, the municipalities of Baixa Grande and Coração de Maria reported not performing this monitoring; in the Eastern region, the municipality of Mata de São João reported not performing it; and in the Southwestern region, the municipalities of Matina and Pindaí reported not performing this monitoring.

Regarding the provision of essential materials, such as registration books and leprosy notification forms, the state, for the most part, provides the necessary support for carrying out activities in health care units. Although only the Extreme Southern macro-region achieved 100% coverage in the distribution of these materials, the other macro-regions showed predominantly high coverage, with more than 70% of municipalities ensuring the provision of basic supplies.

Across all health regions, more than 70% of municipalities routinely conduct periodic leprosy training and update activities. This finding is a positive indicator of the commitment to continuous improvement in care.

However, regional challenges requiring targeted intervention persist. The Southwestern (29.6% of municipalities without this routine), Central-Northern (26.5%), Southern (23.3%), and Western (22.6%) regions showed the highest proportions of gaps in

professional training and updating. This geographic disparity in the provision of continuing health education (CHE) may result in heterogeneity in the quality of leprosy diagnosis and management, requiring a focused action plan to ensure equity of care throughout the health care network.

The preparation of municipal epidemiological bulletins was infrequent in the state. No health region had at least half of its municipalities preparing this

instrument (Figure 3). The Northern region showed the highest adherence, at 47.8%. This finding may limit the decentralized production of information for municipal planning based on timely local data.

It should be noted that, of the 124 municipalities in the state that reported preparing an annual leprosy epidemiological bulletin, only 85 municipalities published the bulletin in 2023, the year preceding the survey.

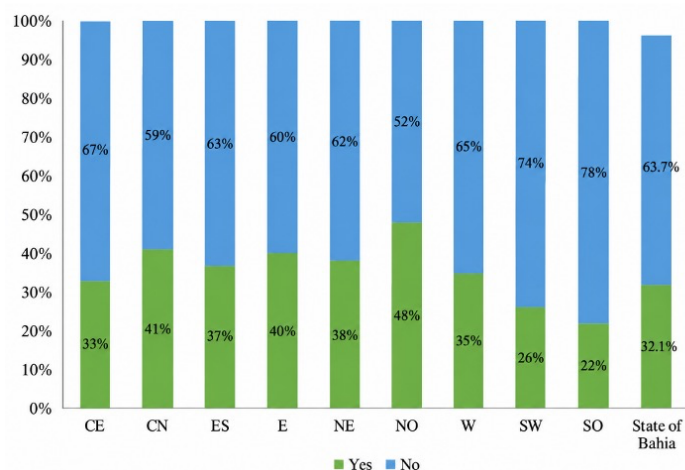


Figure 3. Percentage of municipalities with a surveillance team that prepares an annual leprosy epidemiological bulletin, by health macro-region of Bahia, 2024.

Abbreviation: CE = Central-Eastern; CN = Central-Northern; ES = Extreme Southern; E = Eastern; NE = Northeastern; NO = Northern; W = Western; SW = Southwestern; SO = Southern.

The integration of epidemiological surveillance and Primary Health Care (PHC) activities occurs throughout nearly the entire state. In all health regions, more than 80% of municipalities reported working in an integrated manner, strengthening surveillance activities and care for patients with leprosy. The Northern region stands out, where 100% of municipalities have Primary Health Care (PHC) and Epidemiological Surveillance services working in an articulated and coordinated manner in leprosy-related activities.

Regarding the investigation of relapse cases in Bahia, 96.2% reported investigating relapse cases in accordance with Ministry of Health guidelines and at the request of the State Department of Health (SES).

Regarding the submission of investigation forms to the regional health authority, the Northern region has already established this flow, and 100% of municipalities reported submitting relapse case investigation forms for monitoring and assessment of the need for case validation or referral to more experienced professionals. In addition, the Extreme Southern, Northeastern, and Southwestern regions reported submitting 100% of the forms following investigation.

Another important investigation established by the Ministry of Health concerns grade 2 physical disability. All health regions were found to have cases with grade 2 physical disability, a situation associated with late diagnosis and shortcomings in health care (Figure 4).

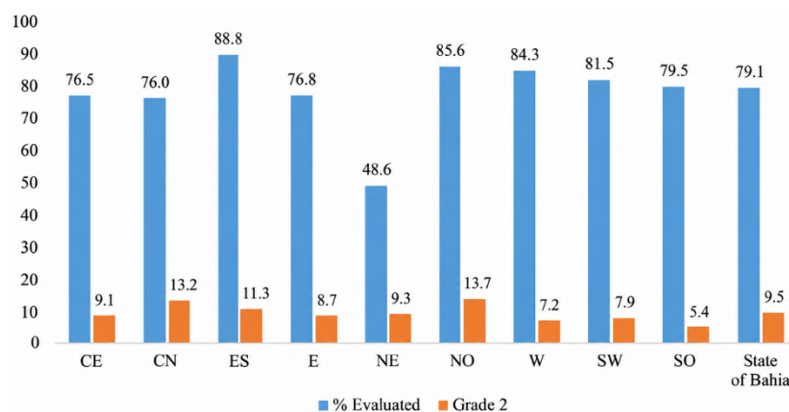


Figure 4. Assessment of physical disability grade at the time of diagnosis and grade 2 physical disability, by health macro-region. Bahia, 2023.

Abbreviation: CE = Central-Eastern; CN = Central-Northern; ES = Extreme Southern; E = Eastern; NE = Northeastern; NO = Northern; W = Western; SW = Southwestern; SO = Southern.

According to guidance from the Ministry of Health, grade 2 physical disability should not be tabulated when

the proportion of cases evaluated is below 75% (Figure 5).



Figure 5. Percentage of municipalities that investigate cases of grade 2 physical disability (G2D) in accordance with the Ministry of Health's G2D Investigation Protocol, by health macro-region of Bahia, 2024.
 Abbreviation: CE = Central-Eastern; CN = Central-Northern; ES = Extreme Southern; E = Eastern; NE = Northeastern; NO = Northern; W = Western; SW = Southwestern; SO = Southern.

When asked about the existence of a defined flow for submitting investigation forms for grade 2 physical disability (G2D) cases, 100% of municipalities in the Northern region reported routinely submitting the forms and having an established submission flow. In the other health regions, more than 70% of municipalities reported submitting the document for monitoring purposes.

Regarding the entry of grade 2 disability investigations into the information system, the findings highlight the need for training on the system and user registration. In all health regions, some municipalities forward the investigation to the regional health authority for entry into the system. It should be noted that municipalities reporting that they do not perform this procedure may not have grade 2 cases requiring investigation.

DISCUSSION

Strengthening health surveillance activities contributes to better control and monitoring of leprosy cases in Bahia. However, the inadequate use of instruments and strategies for controlling these occurrences, such as the registration book and the Follow-up Bulletin, may compromise the effectiveness of prevention and treatment measures.

The use of the treatment registration and monitoring book in health care units still shows gaps in some regions, as observed in municipalities in the Eastern and Western regions. Information contained in the registration book is useful for assessing treatment effectiveness and for appropriately monitoring disease prevalence.¹²

Irregular use of the Follow-up Bulletin in some municipalities indicates weaknesses in SINAN feedback

and in the longitudinal monitoring of cases. Because this instrument contains essential information on clinical progression, treatment adherence, contact evaluation, and case closure, its non-systematic use may compromise the quality of indicators and continuity of care. To provide feedback to this system, Health Care Units are required to update the information and return the bulletin to Epidemiological Surveillance so that the data can be entered back into the Notifiable Diseases Information System (SINAN).^{5,12}

Effective monitoring requires that the Follow-up Bulletin be completed in detail for each notified case, recording crucial information such as the date of the patient's last visit, current operational classification, treatment regimen in use, and the number of MDT-U (multidrug therapy) doses administered. This information helps ensure treatment adherence and appropriate clinical progression of the patient, as recommended by public health protocols.^{5,12,14}

Contact monitoring remains a strategic component of leprosy surveillance; therefore, weaknesses in follow-up instruments may also affect the timely identification and monitoring of contacts. The recommendation is to take advantage of the patient's presence to schedule examinations for all contacts and provide guidance on BCG vaccination, in accordance with the recommendations of the Clinical Protocol and Therapeutic Guidelines (PCDT) of the Ministry of Health.¹³

Finally, at the time of case closure, the Follow-up Bulletin should be completed with the type and date of closure, with cure being the main outcome, as well as the disability grade recorded at discharge due to cure. The latter is a key quality indicator because it reflects the timeliness of diagnosis and the effectiveness of the treatment provided by the health care network.⁵

These data are fundamental and reflect the quality of care provided. In addition, the bulletin allows health professionals to perform detailed monitoring of patients and their contacts. Unfortunately, this strategy has not yet been adopted throughout the entire state, particularly in the Southwestern, Eastern, Western, and Southern health regions.

Although directly comparable studies on the municipal organization of leprosy surveillance are scarce, the findings of this study can be discussed in light of evidence on the quality of information systems, active case finding, and contact tracing in endemic settings. In Brazil, a study conducted in João Pessoa, Paraíba, evaluated leprosy records in SINAN between 2001 and 2019 and identified problems related to completeness, consistency, and duplication, indicating the need for continuous improvement in health information quality.¹⁵ In a hyperendemic area of Northeastern Brazil, active surveillance through household visits was used to identify cases among household and non-household contacts and was presented as a relevant strategy for early diagnosis, timely treatment, and reduction of disabilities.¹⁶ In Cambodia, retrospective active case finding was described as a feasible approach for early case detection in a low-endemicity country, based on contact tracing of previously diagnosed individuals.¹⁷ In an international program involving Brazil, India, Indonesia, Myanmar, Nepal, Sri Lanka, and Tanzania, the integration of contact tracing and administration of single-dose rifampicin was considered feasible within routine leprosy control activities.¹⁸

Leprosy notifications, in accordance with current legislation, are standardized, with a well-defined referral flow that is widely known by health care teams. Strengthening this routine within Municipal Surveillance services is imperative in order not to compromise adherence to the guidelines of the Ministry of Health (MoH).

The high adherence to compulsory notification observed across the macro-regions indicates that this routine has been incorporated into municipal health services, in accordance with the legal requirement for leprosy notification and investigation established by Federal Law No. 6,259, compliance with which is mandatory for all health professionals in the performance of their duties.¹⁹

Notification in SINAN should be performed only for confirmed cases of leprosy. Registration is the responsibility of health professionals and must be completed at the site of diagnosis, whether in a public or private health service, using the SINAN Leprosy Notification/Investigation Form. It is essential that notification occur within the epidemiological week in which the diagnosis is made. To maintain traceability and the information flow, the document must follow the

SINAN protocol established for the health unit, and a copy of the completed form must remain attached to the patient's medical record.⁵

Compulsory notification of diseases, health conditions, and events is an essential and strategic measure for health authorities, enabling the timely identification of occurrences of public health relevance and providing concrete data to support decision-making. Thus, notification serves as an informational pillar, directly supporting the planning and implementation of prevention and control actions aimed at mitigating the future occurrence of such events.²⁰

The production of municipal epidemiological bulletins on leprosy in the state is critical and presents widespread deficiencies. The weakness of this process is evidenced by the fact that no health region reaches the threshold of 50% of its municipalities preparing this instrument.

The epidemiological bulletin is a technical-scientific instrument prepared by specialized epidemiological surveillance teams. Its primary function is to promote the timely and qualified dissemination of relevant health information. By conveying accurate data, the bulletin strengthens the capacity to strategically guide Public Health actions at the municipal, state, and federal levels, serving as an essential health intelligence tool for disease control and prevention.²⁴

The quality of epidemiological surveillance and case registration is directly influenced by supply logistics, and municipalities in the state provide the necessary supplies for leprosy-related actions and strategies.

With regard to professional training, it is recognized as one of the main strategies for overcoming deficiencies and promoting the development of health services.²¹ The periodic provision of training activities in more than 70% of municipalities indicates the presence of continuing education initiatives in most regions. However, the differences observed among macro-regions suggest the need for more homogeneous technical qualification strategies, particularly in territories with a higher proportion of municipalities lacking a routine of professional updating, thereby ensuring a high standard of quality in professional practice and promoting a continuous cycle of improvement and intervention.²²

Epidemiological Surveillance should provide professionals within the health care network with qualified information, ensuring excellence in care and guiding clinical and programmatic practice.²³

With regard to professional qualification in the state, a high level of adherence to continuing health education strategies is observed, strengthening the quality of care and leprosy prevention activities.

The integration of Health Surveillance and Primary Health Care (PHC) activities is regarded as a strategic and promising challenge for strengthening the Brazilian

Unified Health System (SUS). Joint work between Epidemiological Surveillance and PHC enables a synergistic and territorially based approach, which is fundamental to public health. This articulation is essential because it enables disease prevention, continuous monitoring of health conditions, early treatment, and the provision of comprehensive and continuous care to the population.²⁵

Strengthening Epidemiological Surveillance practices is essential to complement the integration of care within PHC, addressing critical demands related to health promotion and disease prevention. Incorporating this approach into the PHC work process is fundamental, as it emphasizes timely detection and immediate case notification, allowing epidemiological investigation and contact tracing to begin within the territory itself. Such actions are vital to interrupting the chain of transmission and preventing new threats to public health.²⁶

For effective monitoring of leprosy relapse cases, it is recommended that state and municipal health authorities review, on a monthly basis, records entered in SINAN and classified as relapse. The objective is to identify previous notifications and the patient's complete history, allowing validation of the classification and accurate correction of the epidemiological record. This systematic verification is crucial for improving information quality and supporting leprosy control actions.⁵

The high proportion of municipalities that investigate suspected relapse cases suggests that this routine has been incorporated into municipal surveillance activities. This finding is relevant because systematic investigation contributes to improving differential diagnosis, validating case classification, and identifying possible therapeutic failures or drug resistance, since relapse (the reappearance of skin and/or neurological lesions compatible with the disease) in patients discharged as cured after previous and regular multidrug therapy typically occurs five years after completion of the treatment regimen.¹³

Given the lack of other studies on this topic in the State of Bahia or in other Brazilian states, and the scarcity of national data specifically addressing the epidemiological surveillance of leprosy, the findings presented here fill an important gap and raise implications for the continuity of monitoring. The results indicate that the municipal health network in Bahia has incorporated the monitoring and investigation of leprosy relapse cases into its operational routine. This continuous surveillance flow is essential to ensure the reliability of differential diagnosis and the timely identification of possible drug resistance or therapeutic failure in the state.

Another important investigation established by the Ministry of Health concerns grade 2 physical disability. The State Department of Health monitors cases in

SINAN in partnership with the regional health authority, following the case investigation, completion of the second ANS, and submission of data to the Grade 2 Physical Disability Information System (SIGIF2).²⁷ Physical complications and disabilities result from delayed diagnosis and lack of treatment for leprosy and may lead to loss of protective sensation, muscle strength, and/or visible deformities of the face and limbs.²⁸

Although investigation of grade 2 physical disability has been incorporated into the routine of the health regions, the data indicate a pressing need for technical training. The focus should be on the operational use of information systems and improvement of registration procedures, ensuring that clinical activities are appropriately reflected in the reliability of state indicators.

In the State of Bahia, there is a clear need for urgent strengthening of leprosy epidemiological surveillance activities. To ensure data quality and strategic management, it is essential to establish and standardize clear flows for case investigation. In addition, state and municipal authorities should ensure the systematic production of information, both through the preparation of annual epidemiological bulletins and the monthly submission of the Follow-up Bulletin to all health care units for SINAN feedback. The routine and rigorous use of monitoring books also constitutes an essential tool that should be incorporated into team practices to improve the longitudinal follow-up of patients.

Coordinating and aligning surveillance activities is essential to achieving the Ministry of Health's national targets for 2030 and contributing to the Global Leprosy Strategy 2021–2030.^{3,29} The international commitments established by this strategy include 120 countries with zero new autochthonous cases, as well as reductions of 70% in the annual detection of new cases, 90% in the rate of grade 2 disability per million inhabitants, and 90% in the rate of new cases per million children.²⁹

Despite the contributions of this study to understanding leprosy surveillance activities in the State of Bahia, some limitations should be considered. First, data on the activities carried out in the municipalities were obtained through a self-administered questionnaire, which may be subject to information bias or discrepancies between reported practices and those actually performed in health services. In addition, participation was voluntary, resulting in non-response from some municipalities, which may limit the representativeness of certain local contexts. Another limitation concerns the use of secondary data from information systems, which may contain inconsistencies or underreporting. To mitigate these limitations, efforts were made to achieve a high municipal response rate, covering 88% of the municipalities in the state, as well as to conduct a combined analysis of different

information sources, including the structured questionnaire and SINAN data, which contributed to improving the consistency and reliability of the findings.

In summary, the findings indicate that leprosy epidemiological surveillance in Bahia has well-established components, particularly with regard to compulsory notification, relapse monitoring, and integration with Primary Health Care. However, weaknesses persist in the use of follow-up instruments, SINAN feedback, preparation of municipal epidemiological bulletins, and the quality of records in monitoring systems. Strengthening these activities should prioritize standardization of municipal routines, technical training of teams, and systematic use of epidemiological information to guide management. These measures are essential to improve case follow-up, reduce inequalities among macro-regions, and contribute to achieving national leprosy control targets.

The findings reinforce the need for intergovernmental agreements and the development of regionalized plans to strengthen leprosy surveillance, focusing on the standardization of routines, technical qualification, and strategic use of epidemiological information. Future studies may investigate the impact of these operational weaknesses on health care and epidemiological indicators of the disease.

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AUTHORS' CONTRIBUTIONS

Thamires Laet Cavalcanti e Silva contributed to the literature review, writing of the abstract, introduction, methodology, and discussion, interpretation and description of the results, preparation of tables, conclusions, review, and statistical analyses. **Natália Cristina de Oliveira** contributed to project administration, literature review, writing of the abstract, introduction, methodology, and discussion, interpretation and description of the results, conclusions, review, and statistical analyses. **Greice Quele dos Santos Cruz** contributed to the development of the project and questionnaire and to manuscript review. **Eleuzina Falcão da**

Silva Santos contributed to manuscript review. **Luiz Eduardo Nunes Ferreira** contributed to project administration, literature review, writing of the abstract, introduction, methodology, and discussion, interpretation and description of the results, conclusions, review, and statistical analyses.

All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.

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