

ORIGINAL ARTICLE

## OPERATIONAL INDICATORS OF TUBERCULOSIS CONTROL IN THE MUNICIPALITY OF BELÉM-PARÁ

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### ABSTRACT

**Objective:** to describe the operational indicators of tuberculosis control in the municipality of Belém in the 2013-2017 period.

**Method:** a quantitative and descriptive study, whose data came from the Notifiable Diseases Information System in the municipality of Belém, obtained together with the Municipal Health Secretariat in June 2019 and relating to the operational indicators of the National Program for Tuberculosis Control. The analysis was performed using descriptive statistics.


**Results:** weaknesses in the control of the disease were identified in the municipality of Belém. All the indicators, whether referring to early diagnosis, treatment or outcome, showed low capacity for disease control in the municipality.


**Conclusion:** failure to meet the targets set implies maintaining the disease in the community and favoring cases of drug resistance, increasing costs, and human suffering. The results make it possible to reflect on the need to monitor the control actions.


**DESCRIPTORS:** Tuberculosis; Monitoring; Operational Research; Process Evaluation; Health Policy.


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## INDICADORES OPERACIONAIS DO CONTROLE DA TUBERCULOSE NO MUNICÍPIO DE BELÉM-PARÁ

### RESUMO

*Objetivo:* descrever os indicadores operacionais do controle da tuberculose no município de Belém no período 2013-2017.

*Método:* estudo quantitativo, descritivo, cujos dados foram oriundos do Sistema de Informação de Agravos de Notificação do município de Belém, obtidos junto à Secretaria Municipal de Saúde em junho de 2019 e dizem respeito aos indicadores operacionais do Programa Nacional de Controle da Tuberculose. A análise se deu por meio de estatística descritiva.

*Resultados:* identificou-se fragilidades no controle da doença no município de Belém. Todos os indicadores, sejam os referentes ao diagnóstico precoce, tratamento e desfecho, mostraram baixa capacidade para o controle da doença no município.

*Conclusão:* o não cumprimento das metas previstas implica na manutenção da doença na comunidade e favorecimento de casos de resistência às drogas, aumentando custos e sofrimento humano. Os resultados possibilitam reflexão acerca da necessidade do monitoramento das ações de controle.

**DESCRITORES:** Tuberculose; Monitoramento; Pesquisa Operacional; Avaliação de Processos; Política de Saúde.

## INDICADORES OPERATIVOS DEL CONTROL DE LA TUBERCULOSIS EN EL MUNICIPIO DE BELÉM-PARÁ

### RESUMEN:

*Objetivo:* describir los indicadores operativos del control de la tuberculosis en el municipio de Belém durante el período 2013-2017.

*Método:* estudio cuantitativo y descriptivo, cuyos datos fueron extraídos del Sistema de Información de Enfermedades de Notificación Obligatoria del municipio de Belém, obtenidos con la intervención de la Secretaría Municipal de Salud en junio de 2019, relacionados con los indicadores operativos del Programa Nacional de Control de la Tuberculosis. El análisis se realizó por medio de estadística descriptiva.

*Resultados:* se identificaron debilidades en el control de la enfermedad en el municipio de Belém. Todos los indicadores, ya sea referidos al diagnóstico precoz, tratamiento o resultado, presentaron escasa capacidad para controlar la enfermedad en el municipio.

*Conclusión:* la falta de cumplimiento de las metas previstas implica la permanencia de la enfermedad en la comunidad, el favorecimiento de los casos de resistencia a los fármacos, con el consiguiente aumento de costos y sufrimiento humano. Los resultados permiten reflexionar acerca de la necesidad de monitorear las acciones de control.

**DESCRIPTORES:** Tuberculosis; Monitoreo; Investigación Operacional; Evaluación de Procesos; Política de Salud.

## INTRODUCTION

Tuberculosis is an infectious disease, transmitted by the Koch bacillus<sup>(1)</sup>. It is considered a neglected disease because it is related to conditions of poverty, poor sanitation, clusterings, and improper housing, situations that perpetuate a perverse cycle of health inequities, exclusion, and stigma<sup>(2)</sup>.

In 2017, the first global conference organized by the World Health Organization (WHO) in conjunction with the Russian government took place. On that occasion, all the Member-States of the United Nations (UN) made a political declaration where their commitment to the Sustainable Development Goals (SDGs) was reinforced, and the WHO's final strategy and new goals were added. In 2018, the UN held its first high-level meeting on tuberculosis, broadening the discussion regarding the epidemic and how to end it<sup>(3)</sup>.

For 2030, the new targets are the following: a 90% reduction in the number of deaths from the disease and an 80% reduction in the incidence rate, compared to the 2015 levels; treating 40 million ill people over a five-year period (2018-2022); reaching at least 30 million people with preventive treatment over a five-year period (2018-2022); and mobilizing at least \$2 billion a year for research related to tuberculosis<sup>(3)</sup>.

As of the Global Conference, with the new 2016-2020 WHO classification, Brazil ranks 20<sup>th</sup> on the list of the 30 priority countries for tackling tuberculosis and 19<sup>th</sup> on the list of the 30 priority countries for TB-HIV, the fourth cause of deaths from infectious diseases and the first among those that affect people living with AIDS<sup>(4)</sup>.

Despite the global and national efforts to effectively control tuberculosis, the scenario in Brazil is still challenging. Regarding mortality, in 2017 4,534 deaths were recorded in Brazil and, among the capitals, the second highest coefficient was recorded in Belém (7.0/100,000 inhabitants)<sup>(5)</sup>.

Regarding the incidence, in 2018 72,788 new cases were diagnosed in Brazil, with the distribution of indicators being heterogeneous by regions, Federated Units (FUs), and capitals. Among the regions, the North had a coefficient of 44.0/100,000 inhabitants. The state of Pará occupied the sixth place in the Brazilian ranking, recording 40.7/100,000 inhabitants for all forms of the disease. In the municipality of Belém, 931 new cases were diagnosed, with an incidence rate of 62.7/100,000 inhabitants, which places the municipality as the fifth highest incidence among the Brazilian capitals<sup>(5)</sup>.

In 2018, the mortality rate in Pará was 3.1/100,000 inhabitants, the cure rate among new cases of laboratory confirmed pulmonary tuberculosis corresponded to 52.9% and, abandonment of treatment, to 8.6%. In Belém, these indexes were 30.3% and 6.6%, respectively. Showing results above the acceptable<sup>(5)</sup>, the abandonment and cure data show that there are problems in the quality of information.

The National Program for Tuberculosis (*Programa Nacional de Controle da Tuberculose*, PNCT) is decentralized to states and municipalities with specific responsibilities for each of these management spheres, coordinating efforts in the formulation of public policies and strategies to reduce morbidity and mortality due to the disease in Brazil, respecting the rights in line with the principles and guidelines of the Public Health System (*Sistema Único de Saúde*, SUS)<sup>(6)</sup>.

The control of the disease is based on the search for cases, early diagnosis, and adequate treatment until the cure, with the objective of interrupting the transmission chain. For this to happen, the PNCT was organized into components and subcomponents, in order to guarantee quality and effectiveness in the services provided. Among these services are health care, focusing on prevention, adequate assistance, and diagnosis, as well as epidemiological surveillance, monitoring, and evaluation of services<sup>(5)</sup>.

Knowing these processes, their importance for the success of tuberculosis control actions and understanding the complexity of these actions, this study aimed to describe the operational indicators of tuberculosis control in the municipality of Belém in the 2013-2017 period.

## METHOD

A quantitative and descriptive study, conducted with 6,970 new cases of all forms of tuberculosis reported in the municipality of Belém, from 2013 to 2017. The data were from secondary sources from the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação*, SINAN) in the municipality of Belém, obtained from the coordination of the Tuberculosis Control Program (*Programa de Controle da Tuberculose*, PCT) of the Municipal Health Secretariat in June 2019 and refer to the operational indicators of the PCNT, in the period from 2013 to 2017.

The operational indicators selected for this study were the following: proportion of new cases discovered among those scheduled; proportion of contacts examined in new cases of pulmonary tuberculosis with laboratory confirmation; proportion of HIV testing among new cases of tuberculosis; proportion of new cases of pulmonary tuberculosis with laboratory confirmation who underwent Directly Observed Treatment (DOT); proportion of cure in new cases of pulmonary tuberculosis with laboratory confirmation; and proportion of treatment dropout in new cases of pulmonary tuberculosis with laboratory confirmation. These indicators are part of a list defined by the Ministry of Health (MoH) for the periodic evaluation of tuberculosis control actions at the federal, state, and municipal levels<sup>(4)</sup>.

The data were organized in spreadsheets using the Excel program, summarized in a descriptive manner, and discussed in the light of the official MoH documents and of the scientific evidence on the subject.

The research was approved by the Research Ethics Committee of the State University of Pará, under opinion No. 3,242,189. Authorization to access the municipal SINAN database was done by signing the term of access to the database by the responsible professional.

## RESULTS

A total of 6,970 new cases of tuberculosis recorded in the municipality of Belém between 2013 and 2017 were included in the study. The parameters established in each indicator are recommended by the WHO and by the Ministry of Health in the PNCT<sup>(7,8)</sup>.

There was a downward trend in the number of cases discovered from 2013 to 2016 and a significant increase in 2017: 81 cases. The proportion of new cases discovered among those scheduled varied around just over 1% upwards or downwards from 2013 to 2016, and increased from 2016 to 2017 (Table 1).

Table 1 - Proportion of new tuberculosis cases discovered among those scheduled in the period from 2013 to 2017. Belém, PA, Brazil, 2019

Year	Scheduled	New cases discovered (n)	(%)
2013	1,64	1,421	86.65
2014	1,64	1,397	85.18
2015	1,578	1,363	86.38
2016	1,578	1,354	85.80
2017	1,558	1,435	92.11
Total	7,994	6,97	87.22

The proportion of contacts examined in the new cases of pulmonary tuberculosis with laboratory confirmation showed a very low percentage throughout the study period, with a greater reduction for the year 2017 (27.22%) (Table 2).

Table 2 - Proportion of examined contacts of the new cases of pulmonary tuberculosis with laboratory confirmation in the period from 2013 to 2017. Belém, PA, Brazil, 2019

Year	Contacts Recorded (n)	Contacts Examined (n)	(%)
2013	3,499	1,361	38.90
2014	3,349	1,02	30.46
2015	3,081	1,123	36.45
2016	3,022	1,205	39.87
2017	3,093	842	27.22
Total	16,044	5,551	34.60

The proportion of HIV testing among the new cases of tuberculosis showed a total of 4,540 (65.14%) in the period studied, with an increasing trend from 2013 to 2014 and a decreasing one from 2015 to 2017 (Table 3).

Table 3 - Proportion of HIV testing among the new cases of tuberculosis in the period from 2013 to 2017. Belém, PA, Brazil, 2019

Year	New cases (n)	HIV test performed (n)	(%)
2013	1,421	886	62.35
2014	1,397	982	70.29
2015	1,363	929	68.16
2016	1,354	898	66.32
2017	1,435	845	58.89
Total	6,97	4,54	65.14

As shown, the proportion of new cases of pulmonary tuberculosis with laboratory confirmation that underwent Directly Observed Treatment (DOT) presented a decreasing trend from 2013 to 2017 (Table 4).

Table 4 - Proportion of new cases of pulmonary tuberculosis with laboratory confirmation that underwent Directly Observed Treatment in the period from 2013 to 2017. Belém, PA, Brazil, 2019

Year	New cases of pulmonary tuberculosis with laboratory confirmation (n)	DOT performed (n)	(%)
2013	1,034	790	55.59
2014	1,019	629	45.03
2015	1,026	451	33.09
2016	1,006	347	25.63
2017	957	300	20.91
Total	5,042	2,517	36.11

Regarding the treatment outcome, shown in Table 5, it is observed that 3,396 (73.60%) cases evolved to cure and 565 (12.25%) to abandonment. Regarding the cure rates, they showed an increasing proportion from 2013 to 2014, and a decreasing one in the rest of the period, with 2017 being the year with the worst performance in the historical series. Although in the first four years the percentages have been regular, at no time have they approached or achieved the expected cure target, which must be equal to or greater than 85%. Treatment dropout varied by around 1% upwards or downwards over the years, constantly staying at high levels.

Table 5 - Proportion of cure and abandonment of treatment among new cases of pulmonary tuberculosis with laboratory confirmation in the period from 2013 to 2017. Belém, PA, Brazil, 2019

Year	New cases of pulmonary tuberculosis with laboratory confirmation	Cure (n)	(%)	Abandonment (n)	(%)	Total (n)
2013	1,034	729	77.55	121	12.87	940
2014	1,019	741	79.08	111	11.85	937
2015	1,026	732	78.79	107	11.52	929
2016	1,006	646	70.37	122	13.29	918
2017	957	548	61.57	104	11.69	890
Total	5,042	3,396	73.60	565	12.25	4,614

## DISCUSSION

The operational indicators for monitoring tuberculosis control reflect the performance of the health services in the quality of care for people with the disease. For the monitoring of the National Plan, some indicators related to the detection, diagnosis, TB-HIV co-infection, and the outcome of tuberculosis cases in Brazil<sup>(8)</sup> were selected. In this study, it was sought to emphasize these indicators when performing this analysis of the operational performance in tuberculosis control in the city of Belém.

Based on the results, it was observed that the discovery of new cases was higher than the parameter of 70%, considered the minimum percentage of discovery by the MoH<sup>(8)</sup>. In general, these results are associated with the active search of cases for early diagnosis but, in the case of this study, this assertion cannot be made, considering that, during the studied period, it was not possible to obtain the number of respiratory symptoms scheduled and examined, for example weaknesses in these records at the municipality's health secretariat.

It is a fact that primary care services must be qualified to meet this demand, and the importance of Basic Health Units with trained and committed teams for the identification of respiratory symptoms for the early diagnosis of tuberculosis patients is indisputable. The team must have adequate infrastructure, logistics, and necessary supplies not only for reception and diagnosis, but also for treatment and monitoring of cases. These are fundamental measures for its control, so that the chain of transmission is interrupted, preventing the spread of the disease and the increase in morbidity and mortality<sup>(9-12)</sup>.

In this context, a very important indicator is the proportion of contacts examined in the new cases of pulmonary tuberculosis with laboratory confirmation; in this study, the rates were well below expectations in all the years studied<sup>(8)</sup>. This result is worrying, considering that this condition is a major challenge for the public administration, especially in the North region, in view of the low adherence in the evaluation among the pulmonary tuberculosis contacts. To neglect this population group is to distance from the control of the disease and to strengthen the growth in the number of new infected people at risk of illness<sup>(13)</sup>.

The WHO<sup>(7)</sup> recommends that 100% of the contacts of cases with laboratory confirmation be examined, since each possible undiagnosed patient tends to infect 10

to 15 individuals in one year, with one or two falling ill, maintaining transmission and the disease at an endemic level<sup>(14)</sup>. Because of this, the MoH recommends contact tracking as a key component for tuberculosis prevention. By means of this strategy, it is possible to detect cases early and to start treatment in a timely manner, aiming at interrupting the transmission chain<sup>(9)</sup>.

The proportion of HIV testing was found to be lower than that recommended by the MoH, which is to test 100% of the tuberculosis patients for HIV<sup>(8)</sup>. This result reiterates the fact that, in 2017, Pará was among the states with the lowest percentages in carrying out this test, as well as Belém among the capitals<sup>(4)</sup>. AIDS is one of the comorbidities that present the highest risk factors for tuberculosis. HIV causes changes in the defense mechanisms of the human organism against the causative agent of tuberculosis and, because of this, HIV infection is the main risk factor for the evolution of the disease<sup>(14)</sup>.

It is important to reinforce the incentive to perform this serological test, a simple test, which must be available in the health units and recommended for all the patients with tuberculosis, with the possibility of enhancing the effectiveness of the treatment, since the increase in the prevalence of HIV derives in serious implications for tuberculosis control<sup>(14)</sup>.

It is worth highlighting that low HIV testing rates among tuberculosis patients can mean the difference between living and dying for these individuals, since AIDS is an important cause of death among these patients. It is necessary to effectively integrate the actions offered between the PCT and HIV/AIDS teams, and between the different points of health care, for the composition of an effective care network consistent with adequate assistance for TB/HIV co-infection. Thinking about this type of assistance implies the creation of a care plan that is proactive, integrated, and continuous<sup>(15)</sup>.

The proportion of new cases of pulmonary tuberculosis with laboratory confirmation that underwent DOT presented worrying results, as they are far below the recommended by the Ministry of Health, which is to maintain 90% of the cases in this treatment regimen. In addition, they showed a steady decline over the years studied, showing great weaknesses in the service.

This strategy is a tool for clinical management in tuberculosis with the potential to promote interdisciplinary care, favoring the implementation of assistance aimed at the profile of the patients, especially those in social and economic vulnerability, favoring access, bonding and welcoming, and enhancing the cure. The evidence<sup>(16-17)</sup> shows that the difficulties in operationalizing the DOT tend to significantly affect the achievement of improvements in the cure and treatment abandonment rates.

To effectively implement the DOT, it is essential to reorganize patient care with strengthening of municipal programs, training health professionals to implement it in primary care, access of patients to early treatment close to their homes, according to their needs and conditions, and involving community health workers, who are facilitators of health promotion and surveillance. It is understood that DOT goes beyond the simple observation of medication intake and should be considered a technology for care management with a comprehensive and humanized approach<sup>(16,18)</sup>.

The proportion of cure in the new cases of pulmonary tuberculosis with laboratory confirmation showed an upward trend until 2015, followed by a fall in the last two years. Similarly to the results found in this study, a research carried out in Paraná, in which the years evaluated did not reach the cure goal, suggested inconsistency in the performance of the DOT as one of the possible factors for this result. The cure target defined by the MoH is especially useful to support the assessment of treatment effectiveness<sup>(16)</sup>.

A similar study made it possible to identify other factors associated with the outcome of tuberculosis treatment in the state of Rio de Janeiro, in the years 2011 to 2014. Being a young adult, black- or brown-skinned, male, with low schooling, living in an urban area, and being institutionalized, were factors associated with a lower chance of cure. These data show the relationship between tuberculosis and poor living conditions<sup>(19)</sup>.



It is highlighted that Primary Health Care has a fundamental role in reaching the cure rates of tuberculosis, as it is the first level of access to the health system, presenting basic organizational principles such as longitudinality, comprehensive care, and coordination of care in the health system itself, enabling greater access, adherence to treatment, and reaching the most vulnerable populations<sup>(20)</sup>.

In all the years analyzed, the proportion of dropouts showed values higher than twice the index considered acceptable by the WHO, which is 5%<sup>(7)</sup>. The break in adherence ends up generating a marked impact on other indicators such as incidence, resistance to multiple drugs, associated diseases, and mortality. The causes associated with the interruption of treatment involve factors intrinsic to the user such as the use of alcohol and other drugs, false impression of cure, and discomfort caused by lack of food, in addition to extrinsic factors such as treatment modality and operationalization of the health services<sup>(21)</sup>.

Social vulnerabilities, TB/HIV co-infection, and drug resistance further aggravate this scenario, increasing the likelihood of unfavorable outcomes, which drive the cycle of disease spread and contagion, increased costs, drug resistance<sup>(22)</sup>, and morbidity and mortality<sup>(22)</sup>.

A study carried out in Belém during 2013 and 2014 in 27 Municipal Health Units pointed out that the information about the treatment is very important for the patient to continue it, and that it can be seen in the services that most of the patients receive information only at the time of diagnosis, with no lectures or groups of meetings that can contribute to a broader knowledge about the disease or to warn about the importance of completing the treatment<sup>(23)</sup>. This reality serves as a basis for the results herein found because, in this scenario, the risk of dropping out increases considerably, making it impossible to achieve goals to reduce abandonment.

It is important that the health professionals devote more attention to maintaining the link with users, not only to avoid abandoning treatment, but so that the health service, without neglecting the user, seeks a systematic rebuilding of the health practices, in the sense of offering care more aligned with the ethical precepts and with the principle of the integrality of the SUS<sup>(21)</sup>.

As a limitation of this study, the use of secondary sources was considered, which may present inconsistencies or incompleteness that could interfere with its results. However, they may contribute to a careful analysis of the possible advances or weaknesses in the operational indicators in the last five years in the municipality of Belém, favoring the analysis of the achievement of goals recommended by the MoH for the municipalities. With this, it is possible to maintain and/or outline strategies that can contribute to the improvement in these indicators and, consequently, in the actions that reach those affected by the disease and treated in the health services.

## CONCLUSION

The results of this study showed weaknesses in the control of tuberculosis in the city of Belém, with results below those recommended to ensure control of the disease, since all the operational indicators, whether referring to early diagnosis, treatment or outcome, showed few possibilities to strengthen disease control in the municipality. This implies maintaining the disease in the community and favoring the emergence of drug resistance cases, increasing the costs and human suffering related to the disease.

It is clear that additional efforts are needed, including greater inter-sectoral articulation with strengthening of management, integration of education, service and community to tackle tuberculosis.

In this context, the operational indicators are important tools for analyzing services

and annual planning. However, for them to show satisfactory results, it is necessary that the municipality invests in infrastructure for the health services, with the implementation of tuberculosis control actions throughout the primary care network, and permanent education policies to qualify the performance of the professionals, among others that add to the practical actions developed in the daily life of the health services and that directly reflect on the quality of the service network.

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