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RESEARCH

# LOCAL AND HEALTH SYSTEMS CONTEXTS IN TUBERCULOSIS CONTROL, STATE OF *SÃO PAULO*

## *CONTEXTOS LOCAIS E DOS SISTEMAS DE SAÚDE NO CONTROLE DA TUBERCULOSE, ESTADO DE SÃO PAULO*

## *CONTEXTOS LOCALES Y DE LOS SISTEMAS DE SALUD EN EL CONTROL DE LA TUBERCULOSIS, ESTADO DE SÃO PAULO*

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## ABSTRACT

**Objective:** to evaluate tuberculosis control in 44 municipalities in *São Paulo* according to aspects of the external, political-organizational and technical-operational context of local health systems. **Method:** operational study of cluster analysis using operational and outcome indicators of new cases of tuberculosis for the years 2014 and 2015; and hypothesis test for proportion to identify association of groups with population size, Gini index, coverage of Community Health Agents Program and Family Health Strategy and per capita expenditure in primary care and epidemiological surveillance. **Results:** the first group (n=19) presented satisfactory results of operational indicators and outcome; the second (n=5) had regular performance (satisfactory outcome and unsatisfactory for directly observed treatment) and was associated with low Gini index and lower proportion of PACS; the third (n=20) group, with poor performance, was associated with a higher Gini index and small population size. **Conclusion:** the findings highlighted the relationship between socioeconomic aspects and the performance of tuberculosis control actions.

***Keywords:*** Tuberculosis; Health Evaluation; Outcome and Process Assessment (Health Care); Quality Indicators, Health Care; Operations Research.

## RESUMO

**Objetivo:** *avaliar o controle da tuberculose em 44 municípios paulistas segundo aspectos do contexto externo, político-organizacional e técnico-operacional dos sistemas locais de saúde.* **Método:** *estudo operacional de análise de agrupamento utilizando indicadores operacionais e de desfecho de casos novos de tuberculose para os anos de 2014 e 2015; e teste de hipótese para proporção para identificação de associação dos grupos com porte populacional, índice de Gini, cobertura de Programa de Agentes Comunitários de Saúde e Estratégia Saúde da Família e despesas per capita em atenção básica e vigilância epidemiológica.* **Resultados:** *o primeiro grupo formado (n=19) apresentou resultados satisfatórios dos indicadores operacionais e desfecho; o segundo (n=5) teve desempenho regular (resultado satisfatório de desfecho e insatisfatório para o tratamento diretamente observado) e esteve associado ao índice de Gini baixo e menor proporção de PACS; o terceiro (n=20) grupo, de desempenho insatisfatório, esteve associado a índice de Gini mais alto e porte populacional pequeno.* **Conclusão:** *os achados destacaram a relação entre aspectos socioeconômicos e o desempenho das ações de controle da tuberculose.*

***Palavras-chave:*** *Tuberculose; Avaliação em Saúde; Avaliação de Processos e Resultados (Cuidados de Saúde); Indicadores de Qualidade em Assistência à Saúde; Pesquisa Operacional.*

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## RESUMEN

***Objetivo:*** *evaluar el control de la tuberculosis en 44 municipios de São Paulo de acuerdo con los aspectos del contexto externo, político-organizativo y técnico-operativo de los sistemas locales de salud.* ***Método:*** *estudio operativo de análisis de conglomerados utilizando indicadores operativos y de desenlace de nuevos casos de tuberculosis para los años 2014 y 2015; y prueba de hipótesis para proporciones para identificar la asociación de grupos con el tamaño de la población, el índice de Gini, el alcance del Programa de Agentes Comunitarios de Salud (PACS) y la Estrategia de Salud Familiar y los gastos per cápita en atención primaria y vigilancia epidemiológica.* ***Resultados:*** *el primer grupo formado (n = 19) presentó resultados satisfactorios para indicadores operativos y desenlace; el segundo (n = 5) presentó rendimiento regular (resultado satisfactorio de desenlace e insatisfactorio para el tratamiento observado directamente) y se asoció con un índice de Gini bajo y una menor proporción de PACS; el tercer grupo (n = 20), de rendimiento insatisfactorio, se asoció con un índice de Gini más alto y poblaciones de menor tamaño.* ***Conclusión:*** *los hallazgos realzaron la relación entre los aspectos socioeconómicos y el desempeño de las acciones de control de la tuberculosis.*


***Palabras clave****: Tuberculosis; Evaluación en Salud; Evaluación de Procesos y Resultados (Atención de Salud); Indicadores de Calidad de la Atención de Salud; Investigación Operativa.*

## INTRODUCTION

A world free of tuberculosis (TB) has been the call of current policies to control the disease in the contemporary panorama, establishing bolder objectives for the management of this disease. The strategy for ending TB, released by the World Health Organization (WHO) in mid-2016 follows the new sustainable millennium goals (Sustainable Development Goals – SDGs) of the United Nations (UN) and aims to reduce 90% of TB deaths and 80% of disease contagion by the year 2030.[1]

To achieve these goals, in a scenario of 10.4 million new TB cases and 1.8 million death as a result of the disease - reported in 2015[1] – there is a need for changes capable of overcoming the new (and old) challenges that TB control faces in relation to the forms the disease is diagnosed and treated and the peculiarities in the organization of health services to implement these activities. Thinking about TB today implies not only considering a health care model that integrates disease management with an integral care project from the perspective of health as an individual right, but also to consider the cost-effectiveness of control strategies and the sustainability of its actions in a context of restricted economic resources, political instability and social vulnerabilities of various natures.[2]

In Brazil, where approximately 69,000 new cases and 4,500 deaths occur each year due to TB, there is extensive literature on the evaluation of the disease control actions. National authors found gaps in the coordination of health services that result in delayed diagnosis and therapeutic process,[3,4] lack of a comprehensive view of the resources involved;[5-7] lack of preparation of municipal managers; difficulties in the provision of services and access to diagnostic and pharmaceutical resources;[8] and difficulties arising from the process of decentralization of TB actions, with emphasis on weaknesses in the physical structure and human resources in basic care services.[9]

Despite this knowledge, the ability to translate evidence from scientific research into recommendations with potential to modify practices depends on the complex political and management process of the responsible bodies. Similarly, the very transfer of policies and guidelines between levels of government is also a process that depends on contextual and technical aspects and power relations.[10]

Thus, the evaluation of the execution of specific programmatic activities in TB cannot be dissociated from the understanding of the local scope, the structure and organization of the health system and the aspects that influence the feasibility of current policies. In this scenario, the *locus* of mesomanagement stands out, in the figure of the coordination of municipal TB control programs (MTCP). The aim is a level of strategic observation for the development of operational research, because it relates both to the macro instance, negotiating resources and partnerships for the sustainability of its actions, and the micro instance, coordinating and monitoring the incorporation and accountability of disease control actions by the level of health services.[11]

This study, therefore, aimed to evaluate the performance of the Tuberculosis Control Program (*Programa de Controle da Tuberculose*-PCT) in priority municipalities in the state of São Paulo (SP), using the program evaluation theory proposed by Oliveira *et al.*[12] as a theoretical-methodological reference. This reference proposes the use of an analysis and judgment matrix composed of dimensions that address the external, political-organizational and technical-operational contexts of the local health systems where the programs are developed. The matrix seeks to express the causal logic of an intervention in its components and as a whole, being able to identify evidence regarding the contribution of each dimension to the production of the effects observed.[12]

To meet the general objective proposed in this research, the study was designed in order to identify groupings of municipalities according to the technical-operational context of TB control actions; and to analyze its association with dimensions of the external and political-organizational context of its operationalization.

## METHOD

An operational study, of health assessment, with ecological design and descriptive-exploratory approach.

Table 1 shows the matrix of analysis and judgment and the description of the indicators and variables that compose it. The matrix of analysis include categories and criteria and judgment

based on experiences and previous studies conducted on the theme of PCT evaluation in the national scenario.[13-15]

External context comprises the macro aspects that are relevant to explain the scenario in which the PCT plans and carries out its activities.[14] On the other hand, the political-organizational context expresses aspects of planning and related to the management level of a health program, including issues such as the technical, political and financial autonomy of the coordination, the management tools available, the human resources working in the management team, the management itself and articulations with other sectors.[14] The technical-operational context, in turn, deals with issues specifically related to the structure and dynamics of the care network where control actions occur.[14] In this research, the operational performance of the PCT was characterized by the indicators that make up the implementation (which reflects the way in which health care actions are conducted by the health services of the municipal care network) and effect (which consisted of the treatment outcome of individuals affected by TB and activities considered a priority by National Tuberculosis Control Program (Programa Nacional de Controle da Tuberculose-PNCT) in the current situation.[14]

Forty-four priority municipalities for TB control in the SSP were recognized as observation units, according to criteria published in a technical note by the PNCT of 2011,[16] current at the time of the study.

To characterize the scenario of implantation and effect that indicate the results obtained by the actions of the PCT, operational and outcome indicators were calculated from new cases data and TB retreatment, resident in the observation units and reported in System of Notification and Monitoring of Tuberculosis Cases in SP (*Sistema de Notificação e Acompanhamento dos Casos de Tuberculose no estado de SP* -TBWEB) between 2014 and 2015. The calculation of the indicators was performed according to the recommendations of the Manual of Recommendations for TB Control,[17] and the 2014 cohort was used to describe the rates of cure, treatment default and death, as well as directly observed treatment (DOT) indicated and effective; and the 2015 cohort for the description of indicators related to diagnostic actions and contacts evaluation, in order to enable timely use of data.

The discrimination of three groups of municipalities according to implementation and effect was performed through

Table 1 - Matrix of analysis and judgment proposed to characterize the scope of implementation and effect of the Municipal Tuberculosis Control Programs according to dimensions of the external and political-organizational context, 2014-2015

| Dimension | Categories | Criteria/Indicators |
|---|---|---|
| Implementation Context | Operational Performance | Proportion of directly observed treatment (DOT) indication among new cases |
| | | Proportion of DOT effectiveness among new cases |
| | | Proportion of contacts examined between contacts registered between new cases |
| | | Proportion of HIV screening among new cases |
| | | Proportion of new cases with bacteriological confirmation |
| | | Proportion of sputum culture and antibiotic sensitivity test between retreatments |
| Effect Context | Treatment outcome | Proportion of cure among new cases |
| | | Proportion of treatment default among new cases |
| | | Proportion of deaths among new cases |
| External context | Social Vulnerability and Socioeconomic Conditions | *Índice Paulista de Responsabilidade Social* (IPRS) |
| | | Gini index of total household income |
| Political-Organizational Context | Resources | Municipal expenditures per capita in Primary Health Care (PHC) |
| | | Municipal expenditure per capita in Epidemiological Surveillance (ES) |
| | | Population coverage of Family Health Strategy (FHS) |
| | | Population Coverage of Community Health Workers Program (CHWP) |

cluster analysis (CA), using the non-hierarchical method. The discrimination power of the variables for group formation was verified through the analysis of variance, considering a significance level of 5%. The indicators "*proportion of death among new cases*", "*proportion of culture between retreatments*" and "*proportion of antibiotic sensitivity test between retreatments*" were excluded from this stage of the analysis, because they did not present power of discrimination between the different groups.

The identification of differences between the characteristics of the external and political-organizational context of the groupings was performed by means of hypothesis testing for proportions, adopting a significance level of 5%. The variables: proportion of population coverage of CHWP and FHS, Gini index, classification of wealth levels according to IPRS and per capita expenditure on Primary Care and Epidemiological Surveillance were categorized into ranges (low, medium and high) based on interquartile values. These data were collected in open access databases by the researcher herself on the websites of the Department of Primary Care (*Departamento de Atenção Básica*-DAB) of the Brasilian Ministry of Health (*Ministério da Saúde* (BR)) (http://dab.saude.gov.br), the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* -IBGE)(http://ibge.gov.br) and the State Data Analysis System Foundation (*Fundação Sistema Estadual de Análise de Dados*-SEADE)(http://seade.gov.sp.br) in December 2016.

It is noteworthy that this project was approved by the Research Ethics Committee of the *Escola de Enfermagem de Ribeirão Preto – Universidade de São Paulo* (CAAE protocol no. 54193216.4.0000.539), meeting the recommendations contained in Resolution No. 466/12 of the National Health Council (*Conselho Nacional de Saúde*- CNS), and obtained consent from the coordination of the State Tuberculosis Control Program (*Programa Estadual de Controle da Tuberculose* -PECT) for its development.

## RESULTS

Three distinct groups were identified in relation to the implementation and effect of TB control actions (Figure 1), characterized by a first grouping of municipalities (n= 19), presenting satisfactory outcome results, DOT, HIV/AIDS screening, contacts evaluation and bacteriological confirmation; a second grouping (n=5 municipalities) of regular operational results, good outcome results and low indication and accomplishment of DOT; and a third grouping (n=20 municipalities) of unsatisfactory performance, with more treatment default even with regular results in relation to DOT (Table 2).

The hypothesis test for proportions revealed that the regular group differs from the other groups with a higher proportion of municipalities with low Gini index and presents a lower proportion of municipalities with high CHWP coverage when compared to the unsatisfactory group. It was also identified that the unsatisfactory grouping differs from the regular group with a higher proportion of municipalities with high Gini index and has the highest proportion of municipalities with less than 135,000 inhabitants (smaller population size) among the groups (Table 3).

## DISCUSSION

The prioritization of municipalities for tuberculosis control is a well-established strategy in the national scenario, started in 1994 by the PNCT as an instrument for planning actions in epidemiological relevant scenarios that allowed the establishment of a fundraising system and more political visibility for municipalities in carrying out TB control actions. Currently, the SP, recognized for its peculiar magnitude, covers 51.8% of the total number of priority municipalities in the Southeast region and deals with the highest burden of TB cases among federal units – the 6th in incidence rate in the country.[17]

In relation to the performance identified by the different groupings of municipalities, the advantages in the joint analysis of outcome results and essential programmatic activities in achieving a better quality disease control are verified. We highlight the variations around DOT indication and accomplishment proportions in the different groups, with favorable outcome results even with low levels of treatment supervision; and unfavorable results with regular DOT levels. This result raises the need for better understanding the reasons of not realizing supervision of all the patients with indication of this treatment modality, as well as other determinants in the achievement of favorable outcomes.

For the proper analysis of these issues, it is necessary to consider the issues related to the supervision recording, which depends on the correct records feeding by the local team responsible for the treatment. However, the completion and transfer of follow-up bulletins, the main source for the compilation of data to the central level, does not replace monitoring and analysis this information by the professionals involved in the care service, who should problematize DOT operationalization, including this evaluation in their action plans. A study by Rêgo *et al.*[18] identified the absence of periodicity in the treatment supervision and an overload of the nurses in the coordination of this activity, aspects that can contribute to the non-compliance of the supervised doses and that make it impossible to develop a care model capable of overcoming the rigidity imposed in the therapeutic course of sick individuals.

Additionally, since the DOT accomplishment indicator is conditioned to the number of supervised doses, it is necessary to consider the variety in supervision understanding and operationalization, not only as direct observation of drug intake, but as possible technology to strengthen the bond between professionals and patients and the capacity to coordinate care.[19]

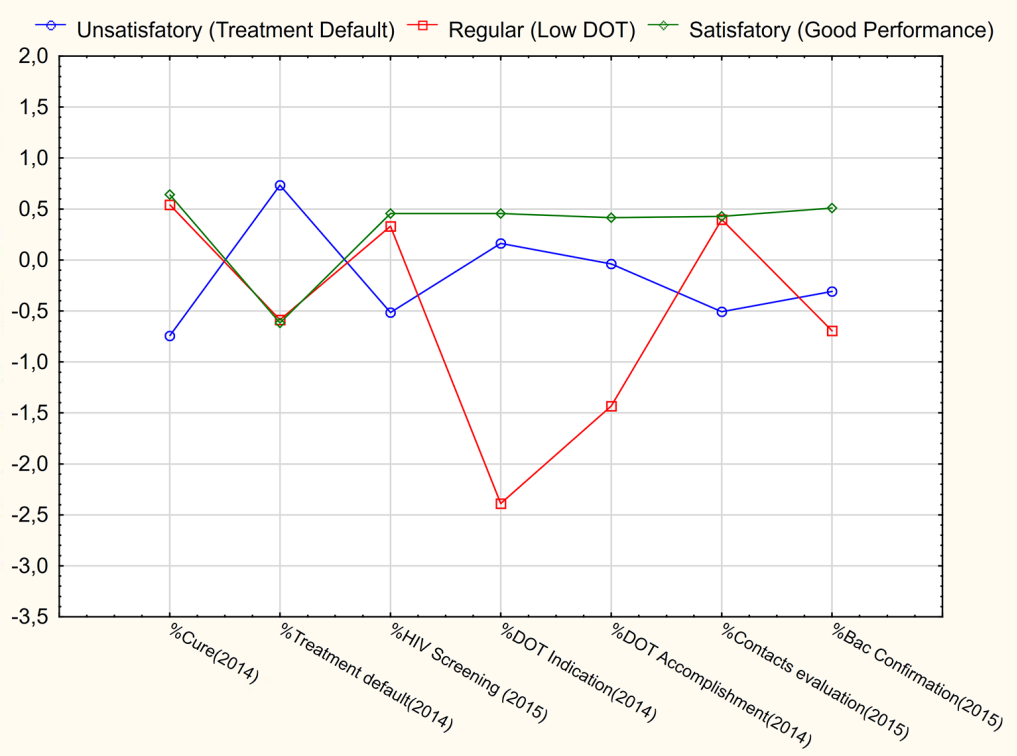


Figure 1. Centroids referring to the groups of municipalities in the state of São Paulo according to the performance of Tuberculosis Control Programs by non-hierarchical grouping analysis method, 2014-2015.

Table 2 - Average of the operational and outcome indicators of the groupings of municipalities in the state of *São Paulo* according to the performance of the Tuberculosis Control Programs, 2014-2015.

| Indicator | Satisfactory Group (n = 19) | | Regular Group (n = 5) | | Unsatisfactory Group (n = 20) | | F Test |
|---|---|---|---|---|---|---|---|
| | Mean | (DP) | Mean | (DP) | Mean | (DP) | |
| Proportion of HIV screening among new cases | 94.7% a | 3.9% | 93.4% ab | 4.5% | 84.8% b | 12.8% | 0.005039* |
| Proportion of new cases with bacteriological confirmation | 75.1% b | 6.7% | 61.3% a | 20.7% | 65.7% a | 10.0% | 0.007091* |
| Proportion of contacts examined among those identified in new cases | 72.9% a | 19.6% | 72.2% ab | 13.2% | 50.3% b | 25.2% | 0.006354* |
| Proportion of DOT indicated among new cases | 85.8% a | 10.3% | 12.9% b | 18.7% | 78.3% a | 13.0% | 0.000000* |
| Proportion of DOT accomplishment among the indicated cases | 56.4% a | 29.6% | 4.0% b | 8.9% | 43.6% a | 20.0% | 0.000420* |
| Proportion of cure among new cases | 88.2% a | 3.9% | 87.6% a | 2.0% | 79.7% b | 5.4% | 0.000002* |
| Proportion of treatment default among new cases | 4.4% a | 2.6% | 4.5% a | 3.4% | 10.4% b | 3.9% | 0.000003* |

Legend: DOT - Directly Observed Treatment. Different letters mean a statistically significant difference between the proportions of the variables according to the F test, considering a significance level of 5%, i.e., p<0.05.

Table 3 - Distribution of frequency variables related to external and political-organizational contexts according to the groupings of priority municipalities in the state of *São Paulo* according to the performance of Tuberculosis Control Programs, 2014-2015

| Variables | | Groups | | |
|---|---|---|---|---|
| | | Satisfactory (n=19) % | Regular (n=5) % | Unsatisfactory (n=20) % |
| Size | Small | 26.3 | 20 | 75 |
| | | a | a | b |
| | Medium | 63.2 | 80 | 15 |
| | | a | a | b |
| | Large | 10.5 | 0 | 10 |
| | | a | a | a |
| Gini Index | High | 47.4 | 0 | 55 |
| | | ab | a | b |
| | Medium | 31.6 | 20 | 30 |
| | | a | a | a |
| | Low | 21 | 80 | 15 |
| | | a | b | a |
| Wealth level (according to IPRS) | High | 73.7 | 60 | 75 |
| | | a | a | a |
| | Low | 26.3 | 40 | 25 |
| | | a | a | a |
| FHS Population Coverage | Low | 31.6 | 40 | 15 |
| | | a | a | a |
| | Medium | 47.4 | 20 | 60 |
| | | a | a | a |
| | High | 21 | 40 | 25 |
| | | a | a | a |
| CHWP Population Coverage | Low | 21 | 40 | 25 |
| | | a | a | a |
| | Medium | 42.1 | 60 | 20 |
| | | a | a | a |
| | High | 36.9 | 0 | 55 |
| | | ab | a | b |
| Per capita expenditure in PHC | Low | 26.3 | 40 | 20 |
| | | a | a | a |
| | Medium | 42.1 | 60 | 55 |
| | | a | a | a |
| | High | 31.6 | 0 | 25 |
| | | a | a | a |
| Per capita expenditure in ES | Low | 21 | 40 | 25 |
| | | a | a | a |
| | Medium | 58 | 40 | 45 |
| | | a | a | a |
| | High | 21 | 20 | 30 |
| | | a | a | a |

IPRS – *Índice Paulista de Responsabilidade* Social; CHWP – Community Health Workers Program; PHC – Primary Health Care; ES – Epidemiological Surveillance
Legend: different letters mean a statistically significant difference between the proportions of the variables according to hypothesis test for proportions, considering significance level of 5%, i.e., p<0.05.

To understand the aspects that influence the achievement of the goals of cure and treatment default and implementation and effect context dimensions, we highlight the association between unsatisfactory grouping and Gini indicators, which express greater concentration of income and, therefore, more economic inequality. This result may indicate a reflection of the relationship between TB illness and unequal socioeconomic conditions in society, a fact identified from the individual to the collective level, by aspects of the spatial aggregation of individuals, as well as by peculiar characteristics of the territory, as reported in a systematic review of the literature.[20] Cities/areas with high Gini index have been associated with a high frequency of unfavorable results, such as TB death,[21] in the state of Rio de Janeiro, and treatment default,[22] in the state of São Paulo, which corroborates the findings of this study.

In this study, we also used the classification of municipalities through the *Índice Paulista de Responsabilidade Social* (IPRS), which gathers data related to economic aspects, dimensions related to social life and individuals' quality of life, using data on income, education and longevity. Although no association was found between performance groups and the IPRS, the results showed that most priority municipalities are in groups that indicate good levels of wealth, which alone does not guarantee good social conditions for the population as a whole.

Another aspect verified was the greater number of municipalities smaller than 135,000 inhabitants among the unsatisfactory grouping. Smaller municipalities may have less qualification or more instability in management positions and functions and low quantity of human resources, which may influence the performance of PCT actions.[23] Cunha *et al.*[24] reported that, in smaller municipalities or with restricted organizational structure, the coordinator is overloaded by acting as a "handyman", which impairs their ability to diagnose and planning interventions appropriate to the local reality.

Despite the low proportion of CHWP coverage in relation to the unsatisfactory group, other relevant aspects of the structure and organization of health system sites, such as FHS coverage and per capita expenditure in PHC and ES, also showed no association with the performance groups in this study. It is important to highlight, however, that the implementation and consolidation of such strategies to reorder PHC are characterized not only by the extent of their coverage, but also in relation to their introduction into the local ideological and paradigmatic space, since the decentralization of TB actions and CHWP and FHS coverage do not always lead to favorable results in diagnosis[25] or DOT coverage.[22]

Considering this panorama, it is important to reflect how health policies have guided a qualification of tuberculosis actions offered by the Unified Health System (*Sistema Único de Saúde* -SUS). Goals and indicators established by federal incentive policies can be of great help to municipal managers, such as the Health Surveillance Actions Qualification Program (*Programa de Qualificação das Ações de Vigilância em Saúde* -PQA-VS), which incorporates the evaluation of disease contacts to the scope of TB indicator panels. However, even if the implementation of several TB actions has historically been based on incentive policies, with financial transfers conditioned to results, and this induced modality has had positive impacts, it is necessary to stimulate the capacity of the municipality own organization to ensure the sustainability of these measures. Goals will be achieved to the extent that the relationships between people, technologies and resources are aligned for making the available strategies more effective, which generates an even greater challenge for the locus of mesomanagement.

It is important to highlight that the PNCT currently proposes a new methodology for prioritizing municipalities and states, establishing eight national sub-scenarios that include socioeconomic, epidemiological and operational indicators through similarity grouping strategies. Thus, it reinforces the need for an analysis that addresses the various dimensions that explain or influence the performance of TB control actions. In addition, the National TB Control Plan stresses the integration of the three pillars recommended by the End TB Strategy: person-centered care, bold policies and support and intensification systems of research and innovation, stimulating the use of research results in coping with tuberculosis.

Finally, the limitations of the study include the number of municipalities covered in the analysis, which may have restricted the identification of differences between the groupings and aspects of the external and political-organizational context; the purely quantitative approach, which did not allow to incorporate subjective data and information; and the use of secondary data. Thus, we highlight the exploratory nature of the research and the need for further studies that deepen the issues identified from the findings of this study.

## CONCLUSION

The results revealed groups of municipalities characterized by different performances in the treatment supervision and in the cases outcome results, including groups with low rates of treatment default and low accomplishment of DOT; and group with high default rate and regular treatment supervision. Although the priority municipalities of the SSP constitute a group of cities, mostly with good income conditions, an association was identified between the group of unsatisfactory performance and the socioeconomic context of more economic inequality and municipalities with a smaller population size. The monitoring and evaluation of the performance of TB control actions can help to detect weaknesses and support the process of management and planning of more effective strategies to achieve adequate management of this problem.

## REFERENCES


1. World Health Organization. Global tuberculosis report 2017. Geneva: World Health Organization; 2017.
2. Maciel ELN. Post-2015 agenda strategies for tuberculosis control in Brazil: challenges and opportunities. Epidemiol Serv Saúde. 2016[cited 2019 Mar 12];25(2):423-6. Available from: http://dx.doi.org/10.5123/s1679-49742016000200021
3. Andrade RLP, Scatolin BE, Wysocki AD, Beraldo AA, Monroe AA, Scatena LM, et al. Tuberculosis diagnosis: primary health care or emergency medical services? Rev Saúde Pública. 2013[cited 2019 Mar 12];47(6):1149-58. Available from: http://dx.doi.org/10.1590/S0034-8910.2013047004650
4. Villa TCS, Ponce MAS, Wysocki AD, Andrade RLP, Arakawa T, Scatolin BE, et al. Early diagnosis of tuberculosis in the health services in different regions of Brazil. Rev Latino-Am Enferm. 2013[cited 2019 Mar 12];21(spe):190-8. Available from: http://dx.doi.org/10.1590/S0104-11692013000700024
5. Loureiro S, Ferreira Júnior HM, Mota FB, Freitas LFS. Uma análise exploratória dos programas de controle da tuberculose da Bahia e Goiás à luz da teoria dos custos de transação. Saude Soc. 2013[cited 2019 Mar 12];22(1):85-98. Available from: http://dx.doi.org/10.1590/S0104-12902013000100009
6. Guerra RL, Dorman SE, Luiz RR, Conde MB. Cost-effectiveness of routine diagnostic evaluation of pulmonary tuberculosis in a primary care unit in Brazil. Int J Tuberc Lung Dis. 2013[cited 2019 May 12];17(10):1336-40. Available from: https://www.ingentaconnect.com/content/iuatld/ijtld/2013/00000017/00000010/art00015?crawler=true
7. Steffen R, Menzies D, Oxlade O, Pinto M, Castro AZ, Monteiro P, et al. Patients' costs and cost-effectiveness of tuberculosis treatment in DOTS and non-DOTS facilities in Rio de Janeiro, Brazil. Plos One. 2010[cited 2019 Mar 12];5(11):e14014. Available from: https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0014014&type=printable
8. Lopes LMG, Viera NF, Lana FCF. Análise dos Atributos da Atenção Primária à Saúde na atenção à tuberculose no Brasil: uma revisão integrativa. Rev Enferm Cent-Oeste Min. 2015[cited 2019 Mar 12];5(2):1684-703. Available from: http://www.seer.ufsj.edu.br/index.php/recom/article/view/678
9. Silva-Sobrinho RA, Zilly A, Monroe AA, Pinto ESG, Silva RMM, Villa TCS. Ambivalência das ações de controle da tuberculose na atenção básica à saúde. Rev Rene. 2014[cited 2019 Mar 12];5(4):605-12. Available from: http://periodicos.ufc.br/rene/article/view/1075/1037
10. Souza KMJ, Sá LD, Silva LMC, Palha PF. Nursing performance in the policy transfer of directly observed treatment of tuberculosis. Rev Esc Enferm USP. 2014[cited 2019 Mar 12]; 48(5):874-82. Available from: http://dx.doi.org/10.1590/S0080-6234201400005000014
11. Marcolino ABL, Nogueira JA, Ruffino Netto A, Moraes RM, Sá LD, Villa TCS, *et al*. Avaliação do acesso às ações de controle da tuberculose no contexto das equipes de saúde da família de Bayeux - PB. Rev Bras Epidemiol. 2009[cited 2019 Mar 12];12(2):144-57. Available from: http://dx.doi.org/10.1590/S1415-790X2009000200005
12. Oliveira LGD, Natal S, Felisberto E, Alves CKA, Santos EM. Modelo de avaliação do programa de controle da tuberculose. Ciênc Saúde Colet. 2010[cited 2019 Mar 12];15(Suppl 1):997-1008. Available from: http://dx.doi.org/10.1590/S1413-81232010000700006
13. Gonçalves MJF. Avaliação de programa de saúde: o Programa Nacional de Controle de Tuberculose no Brasil. Saúde Transform Soc. 2012[cited 2019 Mar 12];3(1):13-7. Available from: http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S2178-70852012000100004&lng=pt&nrm=iso
14. Gutiérrez SE. Avaliação da implantação do programa de controle da tuberculose em unidades de saúde da atenção básica nas regionais norte e sul de Cuiabá/MT [dissertação]. Rio de Janeiro: Fundação Oswaldo Cruz, Escola Nacional de Saúde Pública Sergio Arouca; 2010. 133f.
15. Heufemann NEC, Gonçalves MJF, Garnelo ML. Avaliação do programa de controle da tuberculose em cenário Amazônico: desafios em Coari. Acta Amaz. 2013[cited 2019 Mar 12];43(1):33-42. Available from: http://dx.doi.org/10.1590/S0044-59672013000100005
16. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Programa Nacional de Controle da Tuberculose. Portaria. Nota Técnica nº 15 CGPNCTIDEVEP/SVSIMS. Definição de critérios para a priorização de municípios no controle da tuberculose no Brasil. Brasília: Ministério da Saúde; 2011.
17. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Panorama da tuberculose no Brasil: indicadores epidemiológicos e operacionais. Brasília: Ministério da Saúde; 2014.
18. Rêgo CCD, Macêdo SM, Andrade CRB, Maia VF, Pinto JTJM, Pinto ESG. Processo de trabalho do enfermeiro a pessoa com tuberculose na Atenção Primária. Rev Baiana Enferm. 2015[cited 2019 Mar 13];29(3):218-28. Available from: http://www.scielo.br/scielo.php?pid=S1414-81452017000400224&script=sci_arttext&tlng=pt
19. Queiroz EM, De-La-Torre-Ugarte-Guanilo MC, Ferreira KR, Bertolozzi MR. Tuberculosis: limitations and strengths of Directly Observed Treatment Short-Course. Rev Latino-Am Enferm. 2012[cited 2019 Mar 13];20(2):369-77. Available from: http://dx.doi.org/10.1590/S0104-11692012000200021
20. San-Pedro A, Oliveira RM. Tuberculose e indicadores socioeconômicos: revisão sistemática da literatura. Rev Panam Salud Publica. 2013[cited 2018 Dec 15];33(4):294-301. Available from: https://scielosp.org/article/rpsp/2013.v33n4/294-301/
21. Vicentin G, Santo AH, Carvalho MS. Mortalidade por tuberculose e indicadores sociais no município do Rio de Janeiro. Ciênc Saúde Coletiva. 2002[cited 2019 Mar 13];7(2):253-63. Available from: http://dx.doi.org/10.1590/S1413-81232002000200006
22. Yamamura M, Santos Neto M, Freitas IM, Rodrigues LBB, Popolin MP, Uchoa SAC, *et al*. Tuberculose e iniquidade social em saúde: uma análise ecológica utilizando técnicas estatísticas multivariadas, São Paulo, Brasil. Rev Panam Salud Publica. 2014[cited 2019 Mar 13];35(4):270-7. Available from: https://www.scielosp.org/pdf/rpsp/2014.v35n4/270-277/pt
23. Viana ALA, Rocha JSY, Elias PE, Ibañez N, Bousquat A. Atenção básica e dinâmica urbana nos grandes municípios paulistas, Brasil. Cad Saúde Pública. 2008[cited 2019 Mar 13];24(Suppl 1):s79-s90. Available from: http://dx.doi.org/10.1590/S0102-311X2008001300013
24. Cunha NV, Cavalcanti MLT, Costa AJL. Diagnóstico situacional da descentralização do controle da tuberculose para a Estratégia Saúde da Família em Jardim Catarina, São Gonçalo, RJ, 2010. Cad Saúde Coletiva. 2012[cited 2019 Mar 13];20(2):177-87. Available from: https://pdfs.semanticscholar.org/9103/a53f1e29d4fe5f6920dcd39840379a86fb63.pdf
25. Scatena LM, Villa TCS, Ruffino Netto A, Kritski AL, Figueiredo TMRM, Vendramini SHF, *et al*. Difficulties in the accessibility to health services for tuberculosis diagnoses in Brazilian municipalities. Rev Saúde Pública. 2009[cited 2019 Mar 13];43(3):389-97. Available from: http://dx.doi.org/10.1590/S0034-89102009005000022