

# Original Article

## Completeness of tuberculosis control program records in the case registry database of the state of Espírito Santo, Brazil: analysis of the 2001–2005 period\*

Completeness of the data of the Tuberculosis Control Program in the Information System of Notifiable Diseases in the State of Espírito Santo, Brazil: a analysis of the period of 2001 to 2005

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### Abstract

**Objective:** To investigate the completeness of tuberculosis control program records for the 2001–2005 period in the case registry database of the state of Espírito Santo, Brazil. **Methods:** A descriptive study using secondary data analysis. The following variables were studied: race/color; educational level, supervised treatment, sputum culture at treatment outcome, HIV status, sputum smear microscopy at the sixth month of treatment and treatment outcome. **Results:** Using technical parameters of the case registry database of the Brazilian National Ministry of Health regarding the percentage of completeness of data on the reporting forms, the tuberculosis database of the state of Espírito Santo can be classified as fair to excellent. The state of Espírito Santo has 78 cities, 8 of which are considered priorities for tuberculosis control. For the variables studied, the cities not considered priorities presented better completeness of records than did those considered priorities, the exception being the variable treatment outcome, for which the percentage of completeness was comparable among all of the cities. **Conclusions:** Since the cities that are considered priorities accounted for 70.2% of the total number of reports, the responsible officials in those cities should improve the quality of those reports in terms of the completeness of forms and the updating of data, which are fundamental to the reliability of epidemiological analyses. That will make it possible to plan activities aimed at the prevention and control of tuberculosis in the state.

**Keywords:** Tuberculosis; Disease notification; Information systems; Databases as topic.

### Resumo

**Objetivo:** analisar a completude dos dados do Programa de Controle da Tuberculose no Sistema de Informação de Agravos de Notificação do Estado do Espírito Santo no período de 2001 a 2005. **Métodos:** estudo descritivo de análise de dados secundários. As variáveis estudadas foram: raça/cor, escolaridade, tratamento supervisionado, encerramento de cultura de escarro, situação de HIV, baciloscopia de 6º mês e situação de encerramento. **Resultados:** Utilizando-se os parâmetros técnicos do Sistema de Informação de Agravos de Notificação do Ministério da Saúde que dizem respeito ao percentual de preenchimento dos campos das fichas de notificação, o banco de dados sobre tuberculose no estado do Espírito Santo pode ser considerado de regular a excelente. Há no estado do Espírito Santo 78 municípios, dos quais 8 são prioritários no controle da tuberculose. Os municípios não prioritários apresentaram maior completude do que os prioritários em relação às variáveis estudadas, exceto na situação de encerramento, com percentual idêntico de preenchimento. **Conclusões:** Os municípios prioritários são responsáveis por 70,2% do total de notificações, devendo, portanto, melhorar a qualidade dos registros em relação ao preenchimento dos campos e à atualização dos dados, primordiais para a confiabilidade da análise epidemiológica. Isto possibilitará o planejamento de ações de prevenção e controle da tuberculose no estado.

**Descritores:** Tuberculose; Notificação de doenças; Sistemas de informação; Bases de dados.

### Introduction

Tuberculosis (TB) is a highly prevalent, transmissible disease worldwide. It is estimated that one-third of the population is infected with *Mycobacterium tuberculosis*, and there are 8 million cases of TB and 2 million TB-related deaths reported every year.<sup>(1)</sup>

In the state of Espírito Santo, Brazil, 1321 new cases of TB (all clinical forms) were reported in 2003. The incidence rate was 40.6/100,000 inhabitants.<sup>(2)</sup> The cities considered priorities for TB control were responsible for 919 of the new cases, accounting for 70.2% of the total number of reports.<sup>(3)</sup>

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The analysis of the factors determining TB and the evaluation of epidemiological data, as well as the monitoring of the results of preventive and control interventions, can be carried out using the nationwide *Sistema de Informação de Agravos de Notificação* (SINAN, Case Registry Database). The completeness of all data on the reporting forms and the frequent updating of such data are essential for data analysis and for making the database system a reliable information source.<sup>(4)</sup>

The SINAN was developed during the 1990-1993 period in order to solve the problems with the system used prior to that time, the Compulsory Disease Reporting Database.<sup>(5)</sup> It was stipulated that health care institutions would collect data using reporting and investigation forms, specific for each disease, and that these data would then be entered into the first hierarchical level of the database.<sup>(6)</sup> The transfer of data from the SINAN to higher hierarchical levels was provided for in Directive 1882/GM of 12/18/1997.<sup>(7)</sup> In the state of Espírito Santo, these forms are sent to the Municipal Health Departments for data entry. These data are transferred to the State Health Department, either directly (from the cities in the metropolitan area) or (in the case of smaller cities) via regional collection points, after which they are sent to the federal level.

In 1997, according to international evaluations, the quality of the surveillance system in Brazil was considered to be poor to intermediate regarding the availability of data that allowed accurate determi-

nation of the incidence, prevalence, cure rates and mortality rates of TB.<sup>(8)</sup>

Technical SINAN domains monitor the percentage of completed fields on the reporting forms, establishing parameters (cut-off values) in order to evaluate the completeness of the database. Records presenting a status of 'in progress' are also considered incomplete in the data analysis.<sup>(9)</sup> These cut-off values are used for the qualitative evaluation of data from other information systems.<sup>(10)</sup> In the SINAN, these systems are classified based on the completeness of records: excellent when it is  $\geq 90\%$ ; fair when it is 70-89%; and poor when it is  $< 70\%$ . These criteria are important to determine whether the completeness of records affects the database analysis.<sup>(9)</sup>

Differences in race/color among individuals, despite being susceptible to the subjectivity of classification, do not constitute an isolated risk factor, but might indicate vulnerability, associated with social-related problems.<sup>(2,11)</sup> Educational level has been shown to be a risk factor for some leading causes of death in our country.<sup>(2)</sup> Sputum smear microscopy at the sixth month of treatment is important for the bacteriological confirmation of cure in patients who had presented positive sputum smear microscopy results at diagnosis.<sup>(4)</sup> The completion of forms and updating of HIV status are essential to evaluating the coinfection rate of patients with TB, as well as estimating the impact that HIV has on the incidence and mortality of the disease.<sup>(8)</sup>

**Table 1** - Completeness of data related to race/color, educational level and supervised treatment by city in the state of Espírito Santo, 2001-2005.

City	Total cases	Variables					
		Race/color		Educational level		Supervised treatment	
		Completed	%	Completed	%	Completed	%
Priority cities							
Viana	119	91	76.5	95	79.8	83	69.7
São Mateus	198	178	89.9	198	100	175	88.4
Guarapari	233	194	83.3	222	95.3	233	100
Cachoeiro de Itapemirim	442	332	75.1	286	64.7	358	81.0
Cariacica	484	369	76.2	439	90.7	342	70.7
Vila Velha	745	478	64.2	622	83.5	509	68.3
Serra	790	439	55.6	419	53.0	648	82.0
Vitória	1675	1293	77.2	1056	63.0	1485	88.7
Priority cities	4686	3374	72.0	3337	71.2	3833	81.8
Other cities	1814	1516	83.6	1648	90.8	1557	85.8
Statewide	6500	4890	75.2	4985	76.7	5390	82.9

Source: Ministry of Health/Secretary for Health Surveillance/Case Registry Database; data adapted by the author.

All of these factors must be taken into consideration in the determination of the percentage of completeness of the SINAN. However, few studies have been carried out on this theme. The objective of the present study was to investigate the completeness of the Tuberculosis Control Program (TCP) records in the SINAN for the 2001–2005 period in the state of Espírito Santo, Brazil.

## Methods

A descriptive study was carried out using SINAN data from cities in the state of Espírito Santo. The reporting cities, responsible for the surveillance of reported cases until their final outcome, were evaluated. In the analysis, each of the cities that were considered priority cities were evaluated separately and the remaining cities in the state were evaluated as a group. There were eight cities that were considered TCP priorities: Viana, Guarapari, Cariacica, Vila Velha, Serra, Vitória, São Mateus and Cachoeiro de Itapemirim. The last two cities are located in rural areas.

The means of completeness of records from the cities for the 2001–2005 period were calculated using the data from the SINAN data tabulation report, available from the website of the National Ministry of Health on August 3, 2006.<sup>(3)</sup> The data were tabulated after the entry type (new case or unknown) had been defined and the treatment

outcome (defined as all situations other than a change in the diagnosis) had been determined.

The variables addressed on the reporting forms were race/color, educational level and type of treatment (supervised or not). In order to verify the updating of reported cases, the percentage of files in which the status was ‘in progress’ at treatment outcome was calculated in relation to the following variables: sputum culture; HIV status; sputum smear microscopy at the sixth month of treatment; and treatment outcome. In this case, we tabulated the data related to cases reported between January 1, 2001 and September 1, 2005, since the reporting forms should have been completed and cases should have reached their outcome by that time.

## Results

The completeness of race/color data was 75.2% statewide, whereas it was 72 and 83.6%, respectively, in the two groups (the cities considered priorities and the remaining cities). The overall completeness of educational level data was 76.7%; the cities not considered priorities presented better results (90.8%) than did those considered priorities (71.2%). The completeness of supervised treatment data was 82.9% statewide, whereas it was 81.8% and 85.8%, respectively, in the cities considered priorities and in the remaining cities (Table 1).

**Table 2** – Completeness of data related to sputum culture at outcome, HIV status at outcome and sputum smear microscopy at the sixth month of treatment by city in the state of Espírito Santo, 2001–2005.

City	Total cases	Variables					
		Sputum culture at outcome		HIV status at outcome		Sputum smear microscopy at month 6 of treatment	
		Completed	%	Completed	%	Completed	%
Priority cities							
Viana	112	104	92.9	98	87.5	65	58.0
São Mateus	191	188	98.4	188	98.4	179	93.7
Guarapari	227	221	97.4	227	100	210	92.5
Cachoeiro Itapemirim	420	408	97.1	367	87.4	301	71.7
Cariacica	449	305	67.9	153	34.1	205	45.7
Vila Velha	710	657	92.5	664	93.5	555	78.2
Serra	747	633	84.7	669	89.6	641	85.8
Vitória	1607	1598	99.4	1572	97.8	1094	68.1
Priority cities	4463	4114	92.2	3938	88.2	3250	72.8
Other cities	1720	1657	96.3	1576	91.6	1471	85.5
Total state	6183	5771	93.3	5514	89.2	4721	76.4

Source: Ministry of Health/Secretary for Health Surveillance/Case Registry Database; data adapted by the author.

**Table 3** – Completeness of records on treatment outcome by city in the state of Espírito Santo, 2001–2005.

City	Total records	Complete records	%
Priority city			
Viana	112	111	99.1
São Mateus	191	190	99.5
Guarapari	227	227	100.0
Cachoeiro de Itapemirim	420	409	97.4
Cariacica	449	442	98.4
Vila Velha	710	700	98.6
Serra	747	735	98.4
Vitória	1607	1573	97.9
Priority cities	4463	4387	98.3
Other cities	1720	1690	98.3
Total state	6183	6077	98.3

Source: Ministry of Health/Secretary for Health Surveillance/Case Registry Database; data adapted by the author.

The completeness of sputum culture data was 93.3% statewide; compared with 92.2 and 96.3%, respectively, in the priority cities and in the remaining cities. The completeness of HIV status data was 89.2% statewide, whereas it was 88.2% and 91.6%, respectively, in the cities considered priorities and in the remaining cities. The completeness of data related to sputum smear microscopy at the sixth month of treatment was 76.4% statewide, compared with 72.8 and 85.5% in the priority and non-priority cities, respectively (Table 2).

The completeness of the treatment outcome data statewide was 98.3%, identical to that found for both groups of cities (Table 3).

## Discussion

According to the SINAN, treatment outcome data for 2003 were unavailable for only 1.3% of the total number of cases reported in the state of Espírito Santo, compared with 3 and 5.7%, respectively, for the states of Sergipe and Mato Grosso do Sul, and 23.2% for Brazil as a whole.<sup>(2)</sup> All of the cities in the state of Espírito Santo contributed equally to the excellent completeness, providing reliable data regarding treatment outcome. Similarly, data on sputum culture at treatment outcome can also be considered reliable.

Data regarding HIV status at outcome reached 89.2%. Although it is not considered excellent according to the defined cutoff point of 90%, it can be considered reliable for the calculation of the TB/HIV coinfection rate in the state.

The completeness of SINAN data regarding race/color and educational level in the state of Espírito Santo was classified as fair. For both variables, the cities not considered priorities presented higher percentages than did the cities considered priorities. Considering that six of those cities are in the metropolitan area, the combination of these variables is relevant, since it can indicate social inequality, increasing the risk of TB mortality.<sup>(11)</sup> This information can guide measures aimed at this population group.<sup>(2)</sup>

The completeness of the supervised treatment data was generally fair in all of the cities in the state. This is relevant information, since supervised treatment is recommended for all patients with active TB. The cities considered priorities must follow this recommendation by the Ministry of Health and report this information when completing the reporting forms. The completeness of the data related to smear sputum microscopy at the sixth month of treatment was also fair, with better results in the cities not considered priorities. This situation was unexpected, since most of the cities considered priorities are located in the metropolitan area, and the Central Laboratory is in the state capital, providing these cities better access to laboratory tests than that provided to the other cities.

The city with the lowest completeness of records was Cariacica, especially regarding the variables that should be completed at outcome (sputum culture, HIV status and sputum smear microscopy at the sixth month of treatment). Although Cariacica is located in the metropolitan area, the execution

of TCP measures is poor, and many patients from Cariacica are treated in the state capital.

A relevant characteristic of the rural cities, most of which are not considered priorities in TB control, is the fact that, among the technicians responsible for the surveillance program at the central level, turnover has been low. Except in the state capital, the turnover rate among these professionals has been high in the metropolitan area (i.e., in the cities considered priorities).

Epidemiological surveillance is a relevant function of public health care institutions in the control of infectious diseases. The reliability, completeness and updating of data improve their quality and inform the decision-making process.<sup>(12-14)</sup> It is necessary that SINAN technicians in the state identify the factors that might interfere with the adequate updating of data regarding follow-up treatment and treatment outcome, investing in improving the quality of TCP data in the state of Espírito Santo.

## References

1. World Health Organization. What is DOTS? A guide to understanding the WHO-recommended TB control strategy known as DOTS. Geneva: WHO; 1999.
2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Saúde Brasil 2005: uma análise da situação de saúde. Brasília: Ministério da Saúde; 2005.
3. SINAN - Sistema de Informação de Agravos de Notificação [homepage on the Internet]. Brasília: Ministério da Saúde. [cited 2006 Aug 03]. Tuberculose - casos confirmados notificados no Sistema de Informação de Agravos de Notificação - Sinan. Available from: <http://dtr2004.saude.gov.br/sinanweb/index.php?name=Tnet>.
4. Brasil. Ministério da Saúde. Fundação Nacional de Saúde. Tuberculose: guia de vigilância epidemiológica. Brasília: Ministério da Saúde; 2002.
5. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Sistema de Informação de Agravos de Notificação - SINAN: normas e rotinas. Brasília: Ministério da Saúde; 2006.
6. Portal da Saúde [homepage on the Internet]. Brasília: Ministério da Saúde. [cited 2006 Ago 03]. Secretaria de Vigilância em Saúde. Sistema de Informação de Agravos de Notificação - Sinan. Available from: [http://portal.saude.gov.br/portal/svs/visualizar\\_texto.cfm?idtxt=21383](http://portal.saude.gov.br/portal/svs/visualizar_texto.cfm?idtxt=21383).
7. Brasil. Ministério da Saúde. Gabinete do Ministro. Portaria nº 1.882, de 18 de dezembro de 1997. Estabelece o Piso da Atenção Básica - PAB e sua composição. [cited 2006 Aug 03]. Available from: <http://www.mp.se.gov.br/CAO/Arquivos/port1882.doc>.
8. van der Werf MJ, Borgdorff MW. Targets for tuberculosis control: how confident can we be about the data? Bull World Health Organ. 2007;85(5):370-6.
9. SINAN - Sistema de Informação de Agravos de Notificação [homepage on the Internet]. Brasília: Ministério da Saúde. [cited 2006 Aug 03]. Sistema de Informação de Agravos de Notificação - Sinan: Relatórios gerenciais. Available from: <http://dtr2004.saude.gov.br/sinanweb/index.php?name=completitude#>.
10. Mello Jorge MHP, Gotlieb SLD, Soboll MLMS, Almeida MF, Latorre MRDO. Avaliação do sistema de informação sobre nascidos vivos e o uso de seus dados em epidemiologia e estatísticas de saúde. Rev. Saúde Pública. 1993;27(suppl):1-46.
11. Batista LE, Escuder MML, Pereira JCR. A cor da morte: causas de óbito segundo características de raça no Estado de São Paulo, 1999 a 2001. Rev Saúde Pública. 2004;38(5):630-6.
12. Pillay J, Clarke A. An evaluation of completeness of tuberculosis notification in the United Kingdom. BMC Public Health. 2003;3:31.
13. Doyle TJ, Glynn MK, Groseclose SL. Completeness of notifiable infectious disease reporting in the United States: an analytical literature review. Am J Epidemiol. 2002;155(9):866-74.