Revista Científica Escola de Saúde Pública do Ceará Paulo Marcelo Martins Rodrigues
1808-7329 (1809-0893)

ORIGINAL ARTICLE
Public / Collective Health

EVALUATION OF THE TUBERCULOSIS SURVEILLANCE SYSTEM IN A REGION OF CEARÁ

AVALIAÇÃO DO SISTEMA DE VIGILÂNCIA DA TUBERCULOSE EM REGIÃO DO CEARÁ

EVALUACIÓN DEL SISTEMA DE VIGILANCIA DE LA TUBERCULOSIS EN UNA REGIÓN DE CEARÁ

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ABSTRACT
Objective: To evaluate the Tuberculosis Surveillance System in the Fortaleza Health Region. **Method:** This is a descriptive and retrospective evaluative study. Public data were used, and qualitative attributes (data quality) and quantitative attributes (representativeness) were assessed. **Results:** Regarding completeness, 60.71% (n=17) of the variables were classified as excellent. However, six variables were classified as poor, five of which are part of the follow-up form. As for consistency, two of the three variables were classified as excellent. Regarding representativeness, of the 31.004 TB cases, 67.7% (n=20.983) were male patients; individuals of mixed race were the most affected, accounting for 77.9% (n=24.153); the "new case" classification showed the highest number of cases, with 76.78% (n=23,805). **Conclusion:** The system in the region was classified as good in terms of completeness, fair in terms of consistency, and was still found to be representative.
Keywords: *Health surveillance system; Tuberculosis; Health evaluation; Field epidemiology.*

RESUMO
Objetivo: Avaliar o Sistema de Vigilância da Tuberculose na Região de Saúde de Fortaleza. **Método:** Trata-se de um estudo avaliativo descritivo e retrospectivo. Foram utilizados dados públicos e avaliou-se atributos qualitativos (qualidade dos dados) e quantitativos (representatividade). **Resultados:** Quanto à completitude, observou-se que 60,71% (n=17) das variáveis foram classificadas como excelentes. Contudo, seis variáveis foram classificadas como ruins. Sendo cinco variáveis que compõem a ficha de acompanhamento. Em relação à consistência, duas das três variáveis foram classificadas como excelentes. Quanto à representatividade, os 31.004 casos de TB, 67,7% (n=20.983), foram pacientes do sexo masculino; a raça parda foi a mais acometida, com 77,9% (n=24.153); a classificação de caso novo apresentou maior número de casos, com 76,78% (n=23.805). **Conclusão:** O sistema da região foi classificado como bom quanto à completitude, regular quanto à consistência e ainda se mostrou representativo.
Descritores: *Sistema de vigilância em saúde; Tuberculose; Avaliação em saúde; Epidemiologia de campo.*

RESUMEN
Objetivo: Evaluar el Sistema de Vigilancia de la Tuberculosis en la Región de Salud de Fortaleza. **Método:** Se trata de un estudio evaluativo descriptivo y retrospectivo. Se utilizaron datos públicos y se evaluaron atributos cualitativos (calidad de los datos) y cuantitativos (representatividad). **Resultados:** En cuanto a la completitud, se observó que el 60,71% (n=17) de las variables fueron clasificadas como excelentes. Sin embargo, seis variables fueron clasificadas como malas, de las cuales cinco forman parte de la ficha de seguimiento. En relación con la consistencia, dos de las tres variables fueron clasificadas como excelentes. Respecto a la representatividad, de los 31.004 casos de TB, el 67,7% (n=20.983) correspondió a pacientes del sexo masculino; la raza parda fue la más afectada, con un 77,9% (n=24.153); la clasificación de caso nuevo presentó el mayor número de casos, con un 76,78% (n=23.805). **Conclusión:** El sistema de la región fue clasificado como bueno en cuanto a la completitud, regular en cuanto a la consistencia y además se mostró representativo.
Descriptores: *Sistema de vigilancia en salud; Tuberculosis; Evaluación en salud; Epidemiología de campo.*

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INTRODUCTION

Tuberculosis (TB) is an infectious and contagious disease caused by the bacteria *Mycobacterium tuberculosis*, popularly known as Koch's bacillus. TB, although it mainly affects the lungs, can also affect other organs and/or systems of the body. Even though it has been a known disease for a long time, TB still represents a big challenge for public health. Tuberculosis transmission mainly occurs through the respiratory tract when airborne particles released by individuals with active pulmonary or laryngeal tuberculosis are inhaled during coughing, speaking, or sneezing. There are other routes of transmission, such as through the skin and placenta. However, these transmission routes are rare. The main forms of diagnosis are the following: clinical, differential, bacteriological, imaging, and histopathological diagnosis[1].

According to the 2023 Global Tuberculosis (TB) Report, an estimated 10.6 million people fell ill with TB in 2022, equivalent to 133 incident cases per 100,000 population. Among all incident cases of TB, 6.3% were among people living with Human Immunodeficiency Virus (HIV). It is also estimated that the TB incidence rate increased by 1.9% between 2020-2021 and 2021-2022. Two consecutive years of global increases in TB (in 2021 and 2022) resulted in the TB incidence returning to the 2019 level in 2022. Globally, the net reduction in the TB incidence rate from 2015 to 2022 was 8.7%[2].

In 2023, 80,012 cases of tuberculosis were registered in Brazil, which corresponds to an incidence rate of 37.0 cases per 100,000 inhabitants. After two consecutive years of growth, in 2021 and 2022, there was a reduction in the risk of developing the active form of the disease. However, the data for 2023 are still preliminary. Unlike the previous year's bulletin, which indicated an increase in 2022, the most recent information points to a decrease in cases[3].

In the state of Ceará, the São José Infectious Diseases Hospital (Hospital São José de Doenças Infecciosas - HSJ) stood out as the unit with the highest number of tuberculosis notifications in the last 10 years. The hospital was responsible for diagnosing 8.5% of the cases registered in the state. It is worth pointing out that the HSJ is one of the main tertiary units in the Ceará Health Secretariat Network (Secretaria da Saúde do Ceará – SESA). These data highlight the importance of strengthening Primary Health Care (PCH), especially concerning the early diagnosis of tuberculosis[4].

It is important to note that tuberculosis is a compulsorily notifiable disease throughout the country, which is reported through the Notifiable Diseases Information System (Sistema de Informação de Agravos de Notificação – SINAN). According to the Ordinance GM/MS nº 5.201, of August 15th, 2024, TB is notified weekly. It is, therefore, essential to emphasize that one of the main objectives of the evaluation of public health surveillance systems is to ensure the efficient monitoring of problems that are relevant to the health of the population. In addition, this process must occur periodically, including recommendations to improve the quality, efficiency, and usefulness of these systems[5-6].

Nevertheless, until this moment, there are few studies about the evaluation of the tuberculosis surveillance system in Ceará. Based on the above considerations, this study aims to evaluate the tuberculosis surveillance in the Fortaleza Health Region.

METHODS

This study is a descriptive and retrospective evaluation of the Tuberculosis Surveillance System in Fortaleza Health Region, according to the criteria outlined by the Centers for Disease Control and Prevention (CDC) of the United States of America[6.] The Tuberculosis Surveillance System in Fortaleza Health Region was evaluated from 2014 to 2023. The Fortaleza Health Region Superintendency (Superintendência da Região de Saúde de Fortaleza - SRFOR) is composed of 44 municipalities, which, according to the 2022 Census, have a population of 4,553,473 inhabitants, representing 51.77% of the population of the state of Ceará[7-8].

This study utilized publicly accessible data from the Department of Informatics of the Unified Health System (Departamento de Informática do Sistema Único de Saúde - DataSUS), which has as its source the TB Notifiable Diseases Information System. Since it is a secondary database, it is not possible to use all the variables contained in the notification and follow-up forms. The database was accessed on August 31st, 2024. The data were analyzed using Microsoft Office Excel and Epi Info™ 7.2.6.0.

The parameters for assessing completeness were adapted and classified as follows: excellent (≥ 95%), good (90-94%), fair (80-89%), poor (50-79%), and very poor (< 50%)[9]. It is important to emphasize that the ignored field was not considered complete. For the completeness analysis, 28 variables were used, including 10 mandatory fields from the notification form, 8 essential fields from the same form, and 10 variables from the follow-up form. To evaluate consistency, the following adapted parameters were used: excellent (≥ 90%), fair (70-89%), and poor (< 70%)[10]. Three variables were used to analyze consistency.

Representativeness was analyzed through the distribution of tuberculosis cases by year, gender, race, age group, education level, municipality of notification, type of entry, clinical form, and closure status. Based on what the author has elaborated, the following parameter was adopted: of the nine variables analyzed, at least five (more than 50%) of them had similar results in the literature, and a percentage variation of less than or equal to 10% is considered satisfactory, indicating that the study is representative. This study used only secondary data from official and anonymized public databases. Therefore, submission to the Ethics Committee was not required.

RESULTS

Data from 31,004 notification records of confirmed cases in Fortaleza Health Region from 2014 to 2023 were analyzed. To assess completeness, 28 variables from the notification form and the follow-up form were checked. The analysis showed that of the twenty-eight (28) variables analyzed, 60.71% (n=17) were classified as excellent.

It was also possible to observe that of the eight (8) essential field variables, 50% (n=4) were rated excellent. It is important to note that of the six (6) variables classified

as poor, that is, with completeness between 50-79%, 83.33% (n=5) are variables that make up the tuberculosis follow-up form. The education level variable had the lowest percentage of all the variables classified as poor, with 66.85% completeness, as shown in Table 1 (below).

Table 1: Evaluation of the data quality attribute (completeness) of the tuberculosis surveillance system in the Fortaleza Health Region, from 2014 to 2023 (n=31,004).

Variables (mandatory field on the notification form)	Nº - variables filled	Completeness	Evaluation
Date of diagnosis	31,004	100%	Excellent
Gender	30,997	99.98%	Excellent
State of residence	31,004	100%	Excellent
Municipality of residence	31,004	100%	Excellent
Type of entry	31,004	100%	Excellent
Clinical form	30,996	99.97%	Excellent
Sputum bacilloscopy	30,997	99.98%	Excellent
HIV Test	30,997	99.98%	Excellent
Culture	30,997	99.98%	Excellent
Number of contacts	30,673	98.93%	Excellent
Variables (mandatory field on the notification form)	**Nº - variables filled**	**Completeness**	**Evaluation**
Race	29,780	96.05%	Excellent
Education level	20,725	66.85%	Poor
Associated disease/aggravation - AIDS	27,695	89.33%	Fair
Associated disease/aggravation - Alcoholism	28,449	91.76%	Good
Associated disease/aggravation - Diabetes	28,144	90.78%	Good
Chest X-ray	30,574	98.61%	Excellent
Histopathology	30,139	97.21%	Excellent
Date of treatment start	30,123	97.16%	Excellent
Variables (mandatory field on the notification form)	**Nº - variables filled**	**Completeness**	**Evaluation**

State of residence	30,984	99.94%	Excellent
Municipality of residence	30,984	99.94%	Excellent
Bacilloscopy - 1º month	24,996	80.62%	Fair
Bacilloscopy - 2º month	24,246	78.20%	Poor
Bacilloscopy - 3º month	23,413	75.52%	Poor
Bacilloscopy - 4º month	22,706	73.24%	Poor
Bacilloscopy - 5º month	21,893	70.61%	Poor
Bacilloscopy - 6º month	21,025	67.81%	Poor
Closure status*	26,507	96.66%	Excellent
Closure date	26,020	94.88%	Good

Source: DataSUS. Notifiable Diseases Information System (SINAN). Data obtained on August 31st, 2024.
*Case closure status of notifications from 2014 to 2022.

As a result, the tuberculosis surveillance system in the Fortaleza Region, from 2014 to 2023, was classified as good, since it achieved 92% completeness in the fields evaluated (notification and follow-up form). However, when classified by form, the system was rated as excellent in terms of the completeness of the fields on the notification form and as fair in terms of the completeness of the fields on the follow-up form, according to Table 2 (below):

Table 2: Classification of the completeness of the tuberculosis surveillance system in the Fortaleza Health Region, from 2014 to 2023.

Tuberculosis surveillance system	Completeness	Classification
Notification form	96.00%	Excellent
Follow-up form	83.74%	Fair
Notification and follow-up form	92.00%	Good

Source: Prepared by the author, based on research data, 2024.

According to Table 3 (below), it is possible to observe that, of the 3 variables of consistency, 66.66% (n=2) were classified as excellent. Only the date of treatment start ≥ notification date was classified as fair.

Table 3: Evaluation of the data quality attribute (consistency) of the tuberculosis surveillance system in the Fortaleza Health Region, from 2014 to 2023 (n=31,004).

Variables	Nº - variables filled	Consistency	Evaluation
Date of treatment start ≥ date of diagnosis	30,216	97.46%	Excellent
Date of treatment start ≥ notification date	20,453	65.97%	Fair
Notification date ≥ date of diagnosis	30,144	97.23%	Excellent

Source: DataSUS. Notifiable Diseases Information System (SINAN). Data obtained on August 31st, 2024.

As mentioned, representativeness was analyzed based on the distribution of tuberculosis cases by year, gender, race, group, education level, municipality of notification, type of entry, clinical form, and closure status. It was observed that the year with the highest number of notifications was 2023, with 3,480 notified cases, corresponding to 11.22% of the cases in the evaluated period.

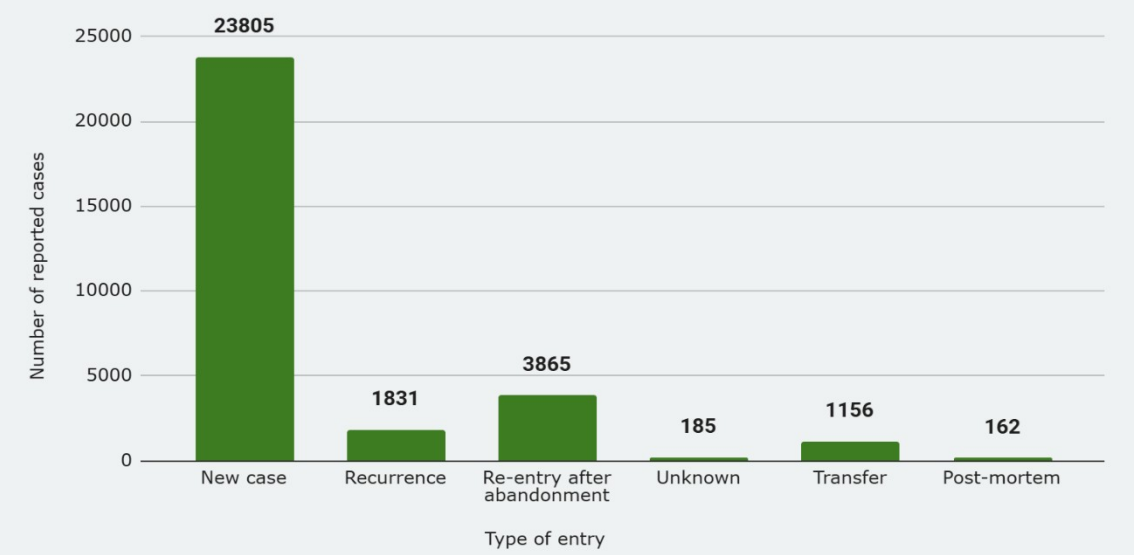
Additionally, a predominance of tuberculosis cases was observed among male patients, with 67.7% (n=20,983). Similarly, the predominance of cases in patients of mixed race/skin color (*parda*), representing 77.9% (n=24,153) of the total notified cases in the Fortaleza Health Region, from 2014 to 2023.

Regarding age group distribution, it was observed that the predominant age group was 20 to 39 years old, with 45.70% (n=14,170), followed by the 40 to 59 years old, with 9,870 cases. As for the distribution of tuberculosis cases by education level, the unknown field accounted for 27.53% (n=8,537) of all cases, followed by the incomplete 5th to 8th grade field, with 14.42% (n=4,472).

Based on the analysis, the municipalities reporting the highest number of tuberculosis cases between 2014 and 2023 were Fortaleza, with 68.8% of the cases; Itaitinga, with 6.9%; Caucaia, with 6.0%; and Maracanaú, with 4.6%.

Among the types of entry, the new case classification had the highest number of cases, with 76.78% (n=23,805), followed by the re-entry type, with 12.46% (n=3,865), and the relapse type, with 5.90% (n=1,831), as shown in Graph 1 (below).

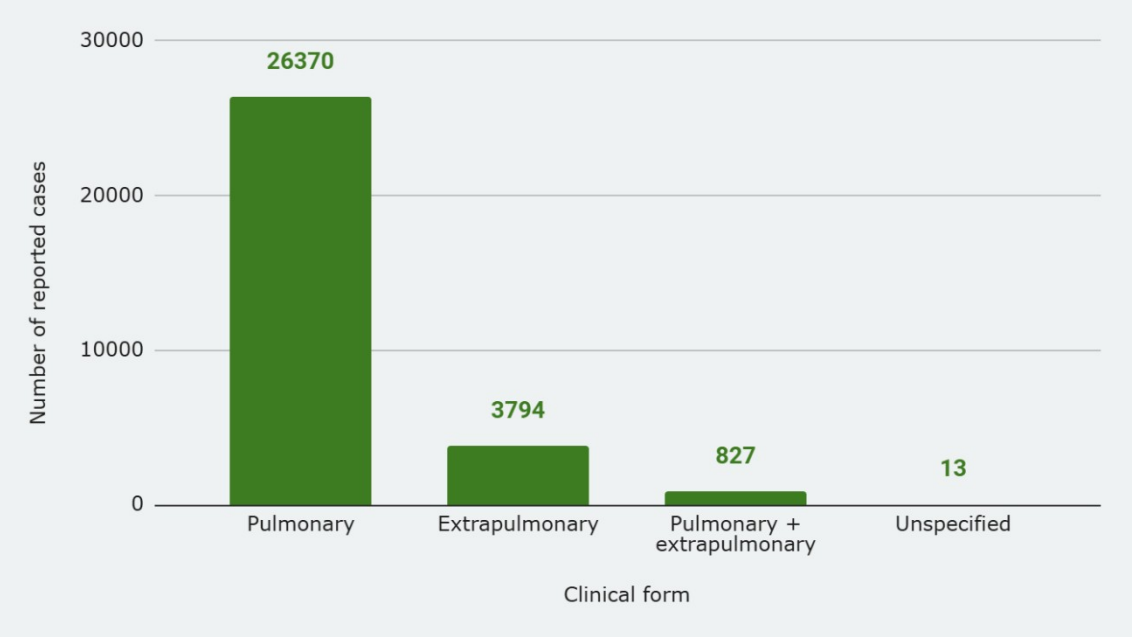
Graph 1: Distribution of tuberculosis cases notified in Fortaleza Health Region, by type of entry, from 2014 to 2023.



Source: DataSUS. Notifiable Diseases Information System (SINAN). Data obtained on August 31st, 2024.

Regarding distribution by clinical form, 85.05% (n=26,370) of all cases corresponded to the pulmonary clinical form, followed by the extra-pulmonary form, with 12.23% (n=3,794), as shown in Graph 2 (below).

Graph 2: Distribution of tuberculosis cases notified in Fortaleza Health Region, by clinical form, from 2014 to 2023.



Source: DataSUS. Notifiable Diseases Information System (SINAN). Data obtained on August 31st, 2024.

Regarding the status/type of closure, closure by cure had the highest number, with 16,036 cases, accounting for 58.47% of the total number of cases reported between 2014 and 2022 in Fortaleza Health Region. It is important to note that, for the case

closure status criterion, cases reported between 2014 and 2022 were considered, totaling 27,424 cases.

After reviewing the literature (local, state, regional and national levels), it was observed that 88.88% (n=8) of the variables assessed in terms of representativeness had findings with a percentage variation of less than or equal to 10%, which were: year of notification, gender, race, age group, municipality of notification, type of entry, clinical form and closure status.

DISCUSSION

Among the mandatory fields on the tuberculosis notification form are sex, type of entry, clinical form, sputum bacilloscopy, HIV test, and culture. These mandatory variables were classified as excellent in terms of completeness. This data is similar to evaluation studies in other regions of the country, such as a study that evaluated the tuberculosis health surveillance system in Belo Horizonte, Minas Gerais, between 2015 and 2020. In this study, it was observed that all the fields initially mentioned had a completeness rate of more than 95%[11].

A survey that analyzed the quality of data from the tuberculosis surveillance system in Brazil's micro-regions between 2012 and 2014 revealed that the completeness of sputum bacilloscopy at the 2nd and 6th months was considered poor or fair in most of the country's states. In the same study, the state of Ceará was evaluated as regular in terms of the completeness of sputum bacilloscopy in the 2nd and 6th months, with 87.7% and 82.0% respectively. It was possible to observe that, in all the federal units evaluated, the completeness of the closure status was rated as excellent, except for Mato Grosso do Sul, which was rated as fair. The state of Ceará showed a completeness rate of 96.8%, making it the second-best performing state in the Northeast region in terms of completeness of case closure status[12].

From the results obtained, it was possible to see that the Fortaleza Health Region had the completeness of the 1st month's bascilloscopy evaluated as fair. However, the completeness of the other bacilloscopies (2nd to 6th month) was rated as poor. The closure status, in turn, maintained a high level of performance, with excellent completeness, corroborating the finding reported in the literature.

Regarding consistency, the variable notification date greater than or equal to the date of diagnosis stood out positively, being classified as excellent, with consistency above 95%. It is noteworthy that, among the three variables evaluated for consistency, two were classified as excellent.

Similarly to the data from a study that assessed the consistency of the tuberculosis surveillance system in Brazil's micro-region from 2012 to 2014, the consistency of the variable notification date greater than or equal to the date of diagnosis was classified as excellent in all the federal units assessed, corresponding to more than 95% consistency.

Regarding representativeness, it was observed that the year with the highest number of tuberculosis notifications in Fortaleza Health Region was 2023, corresponding to 11.22% of the cases in the period evaluated. It was also possible to observe that 67.7% of the notified cases involved male patients. These findings are in

line with an epidemiological study on tuberculosis cases in the Northeast of Brazil from 2013 to 2023, which also identified 2023 as the year with the highest number of cases, with 10.40% of TB cases in the period evaluated. The same study also found that 68.24% of cases were among male patients, while 66.03% of cases were among patients of mixed race/skin color (*parda*)[13].

The predominant age group among the analyzed cases was 20 to 39 years, accounting for 45.70% of the records, followed by the 40 to 59 age group. This pattern is similar to data from an epidemiological study on tuberculosis cases in the Northeast region from 2019 to 2023, in which the predominant age group was also 20 to 39 years, with 43.22% of the cases, followed by the 40 to 59 age group[14].

Regarding education level, it was possible to observe that the field ignored was the most frequent, with 27.53 of the records, followed by the field 5th to 8th grade incomplete, with 14.42% of the cases. However, this data raises concerns about the high number of entries for ignored, as well as reflecting on education level, and the search for healthcare services. It was also possible to observe that the municipalities with the highest number of notified cases were Fortaleza, Itaitinga, and Caucaia, with 68.8%, 6.9% and 6.0% respectively, which corroborates the data from the Ceará epidemiological bulletin, which points out that the six municipalities in Ceará with the highest number of cases are Fortaleza, Juazeiro do Norte, Sobral, Itaitinga, Caucaia, and Maracanaú[4].

With regard to the type of entry, the new case classification was the type with the highest number of cases, with 76.78% of the records, followed by the re-entry type. This finding is consistent with data from other studies, both in Ceará and in other Brazilian states, such as a study on tuberculosis cases in the state of Amazonas from 2015 to 2019, which identified 81.47% of the cases as new[15].

In terms of distribution by clinical form, 85.05% of the cases notified in the Fortaleza region corresponded to the pulmonary clinical form, followed by the extra-pulmonary form. It was also possible to observe that 58.47% of the cases were closed as cured. Similar findings were identified in a study carried out in the Northeast of Brazil, in which the pulmonary form was also the most frequent, with 85.76% of cases, followed by the extra-pulmonary form, with 11.78% of cases. In addition, 59.54% of cases were also closed as cured[13].

Another relevant point refers to the percentage of cases closed due to abandonment in the Fortaleza Health Region, which reached 18.76% between 2014 and 2022. In 2022, the Brazilian Northeast had a percentage of 9.2% of new tuberculosis cases interrupting treatment, with Ceará being one of the states with the highest percentage, at 10.9%. The national percentage was 12,3%[3].

These data show that treatment interruption is a major challenge in the fight against tuberculosis. It should be noted that the Ministry of Health (Ministério da Saúde) has been replacing the term “abandonment” with the expression “treatment interruption” to comply with the guidelines of person-centered language and the use of non-stigmatizing words. Thus, the new term has been employed in reports, in the formulation of indicators, and in data related to this unfavorable outcome[16].

Given this scenario, the importance of ongoing educational activities is reinforced to promote health and minimize the potential risks of illness and/or deterioration, especially in areas with greater vulnerability[17].

Finally, one of the limitations of this study is the use of secondary data, which, although public and accessible, is subject to possible underreporting. Another limitation is the low number of studies evaluating the tuberculosis surveillance system in the Fortaleza Health Region.

CONCLUSION

In conclusion, according to the evaluation carried out, the Fortaleza Health Region presented a tuberculosis surveillance system with excellent completeness in the fields (mandatory and essential) selected from the notification form. The follow-up form was classified as fair, with 83.74% completeness. However, when evaluated overall (notification and follow-up form), the system was rated as good, with 92% for completeness. In terms of consistency, the system was rated as fair, with 86.89%. In terms of representativeness, the system was found to be representative, reflecting the epidemiological and clinical characteristics, since most of the variables verified in representativeness are similar to the findings in the literature. Thus, this type of evaluation contributes not only to health professionals but also to health managers, in order to guide their decision-making regarding activities involving tuberculosis.

RECOMMENDATIONS

Health professionals are advised to fill in all the fields on the notification form and the monthly follow-up bulletin correctly;

Municipal health surveillance secretariats, via epidemiological surveillance, are advised to enter information into SINAN promptly after the accurate completion of notification and follow-up forms;

The Regional Health Superintendence is advised to develop strategies, in collaboration with the Decentralized Health Area Coordinations, to enhance record quality, focusing on the follow-up form and providing continuous technical support to the area covered.

ACKNOWLEDGMENTS

To the tutor, Prof. Ana Paula;

To the Health Region Superintendency of Fortaleza (SRFOR);

To the Ceará School of Public Health;

To the Ministry of Health, through the Training Program in Applied Epidemiology for the Unified System Services (Sistema Único de Saúde - SUS).

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