TIME SERIES OF TUBERCULOSIS MORTALITY IN BRAZIL (1980-2001)

Paula Hino[1]
Moacyr Lobo da Costa-Júnior[2]
Cinthia Midori Sassaki[1]
Mayra Fernanda Oliveira[1]
Tereza Cristina Scatena Villa[3]
Claudia Benedita dos Santos[4]

This descriptive study aimed to describe Tuberculosis-related mortality in Brazil between 1980 and 2001, through time series analysis of data from the DATASUS related to cases in which Tuberculosis was the basic cause of death. The mortality rates were calculated per 100,000 inhabitants according to gender and age. We found a decrease in Tuberculosis mortality of approximately 42% for men and 54% for women across the period analyzed. The International Classification of Diseases was used: ICD-9, for the period of 1980 to 1995; ICD-10 for 1996 to 2001. Deaths are related to late diagnosis, which is a problem of organization of the primary health care, as neither prevention actions nor case detections by active search for respiratory symptoms were incorporated into the health professionals' practice which contributes to higher death rates in more vulnerable groups.

DESCRIPTORS: tuberculosis; mortality; health services

SERIE HISTÓRICA DE LA MORTALIDAD POR TUBERCULOSIS EN BRASIL (1980-2001)

El objetivo fue describir la mortalidad por Tuberculosis en Brasil desde 1980 hasta 2001. Se utilizó un diseño descriptivo por medio de serie temporal, utilizando datos del DATASUS, identificando los casos que presentaron la tuberculosis como causa de muerte. Se calcularon los coeficientes de mortalidad por 100.000 habitantes según sexo y grupo de edad. Los decrecimos de la mortalidad por tuberculosis observados a lo largo de los 22 años fueron aproximadamente del 42% para el sexo masculino y del 54% para el sexo femenino. Se consideró la Clasificación Internacional de Enfermedades, CID-9 para el período de 1980 a 1995 y la CID-10 para 1996 a 2001. Las muertes están relacionadas al diagnóstico tardío, que es un problema de organización de la atención primaria a la salud, dado que las acciones de prevención no fueron incorporadas en la práctica de los profesionales de salud, situación que contribuye para el aumento de la mortalidad en los grupos más vulnerables.

DESCRIPTORES: tuberculosis, mortalidad, servicios de salud

SÉRIE HISTÓRICA DA MORTALIDADE POR TUBERCULOSE NO BRASIL (1980-2001)

A presente investigação buscou descrever a mortalidade por tuberculose no Brasil no período de 1980 a 2001. Utilizou-se um desenho descritivo por meio de série temporal utilizando dados do DATASUS que tiveram a tuberculose como causa básica de óbito. Foram calculados os coeficientes de mortalidade por 100.000 habitantes segundo sexo e faixa etária. Os decréscimos da mortalidade por tuberculose observado ao longo dos 22 anos analisados foram de aproximadamente 42% para o sexo masculino e 54% para o sexo feminino. Considerou-se a Classificação Internacional de Doenças, CID-9 para o período de 1980 a 1995 e a CID-10 para 1996 a 2001. Os óbitos estão relacionados ao diagnóstico tardio, que é um problema de organização da atenção primária à saúde, uma vez que as ações de prevenção não foram incorporadas na prática dos profissionais de saúde, o que contribui para o aumento nas taxas de óbito em grupos mais vulneráveis.

DESCRITORES: tuberculose; mortalidade; serviços de saúde

[1] Doctoral Student, Capes Sholarship, e-mail: paulahino@yahoo.com.br, midsas@eerp.usp.br; [2] Professor, e-mail: moacyr@eerp.usp.br; [3] Associate Professor, e-mail: tite@eerp.usp.br; [4] Professor, e-mail: cbsantos@eerp.usp.br. University of São Paulo at Ribeirão Preto, School of Nursing, WHO Collaborating Center for Nursing Research Development, Brazil

Rev Latino-am Enfermagem 2007 setembro-outubro; 15(5):936-41
www.eerp.usp.br/rlae

Time series of tuberculosis...
Hino P, Costa-Júnior ML, Sassaki CM, Oliveira MF, Villa TCS, Santos CB.

937

INTRODUCTION

Tuberculosis (Tb) remains a major Public Health issue. This is especially true in developing countries, considering that 95% of the notified cases and 98% of Tb deaths in the world occur in developing areas[1]. The epidemic is disseminated throughout the general population, where it prevails among young adults. Consequently, this affects these countries' economy, and becomes a permanent medical-social issue. Besides the AIDS epidemic, the socioeconomic situation has increased poverty, thus resulting in difficult access to health services, growing periphery populations, population clusters and migrations in the search for a better quality of life. An additional factor is the weakness of the Public Health system, which has become increasingly ineffective over the last decades[2-3].

Several studies have called attention to emerging and reemerging diseases. Some even claim that Tb is a reemerging problem. This statement could be valid for some European countries, and even the United States of America, but not for Brazil. Over the last decades, Tb control has been greatly ignored by public policies, society and even the scientific community, in the illusion that the problem had already been solved and/or was under control[4]. An additional factor is the progressive increase of multiple drug resistant bacilli.

In Brazil, similarly to what occurred in other countries on the American Continent, the National Program elaborated successive Tb control plans to reduce the problem. Nevertheless, the country still has approximately 90.000 notified Tb cases per year, and it is estimated that about 30% of cases are underreported, which could cause an aggravation of the disease in the future[5]. In 2000, Brazil had an incidence rate of 48.4/100000 inhabitants, indicating 82,249 new Tb cases. There were 5,879 notified deaths and a mortality rate of 3.8/100,000 inhabitants. The estimate for new Tb cases was 11/100,000 inhabitants, higher than the identified rate. This difference is directly associated with the system of death notifications, because only 70% of the deaths in the country actually reach the information system, and, among these, about 20-30% are deaths by unclear causes[6].

In Brazil, Tb mortality began to drop drastically in the 1950s, with the advent of chemotherapy, and the speed of decrease was reduced in the following decades. In Brazilian capitals, this reduction amounted to 61.4% between 1970 and 1979, with an average 10% decrease per year. The North and Northeast have always had the highest average rates. Between 1977 and 1987, the decrease was 51.7%; that is, 5.4% per year. In Brazil, among the notified cases of people aged 13 or more, 26.9% of carriers are co-infected with Tb/HIV[7].

Today, deaths by Tb mostly result from late diagnosis, and are especially concentrated in deprived social groups, which have less access to health care services. It is estimated that, in developed countries, the minimum diagnosis time for Tb carriers is three months[8]. In developing countries, diagnosis takes much longer, and, consequently, leads to a higher number of carriers and new cases[9].

Regarding Tb, early detection and treatment is a practical measure to save lives and recover patients' health. Before chemotherapy, 50% of untreated patients died, 25% became chronic and 25% were spontaneously cured. Today, the Tb control method used in society is the active search for symptomatic individuals within the community and treatment of new cases as soon as possible.

The purpose of this study is to outline Tb mortality in Brazil from 1980 to 2001.

METHODOLOGY

The study was conducted with a descriptive design, by means of a time series, using secondary data from the Single Health System Information Department-DATASUS. This study included deaths occurred in Brazil from 1980 to 2001, which had Tb as the main death cause. The International Classification of Diseases ICD-9 was considered for the period from 1980 to 1995 and ICD-10 for 1996 to 2001.

Mortality rates per 100,000 inhabitants were calculated per gender and age groups. The population used in this study was obtained from the Brazilian Institute of Geography and Statistics (IBGE). An MS Excel™ table was created with the data related to Tb deaths. Tables were used for descriptive data presentation, displaying death rates per age group and gender.

RESULTS

This study presents an approach of the evolution of real Tb mortality rates in Brazil, which

Time series of tuberculosis...
Hino P, Costa-Júnior ML, Sassaki CM, Oliveira MF, Villa TCS, Santos CB.

Rev Latino-am Enfermagem 2007 setembro-outubro; 15(5):936-41
www.eerp.usp.br/rlae

938

are currently decreasing. Similar situations have been observed in other countries[10-11].

Table 1 presents the mortality rate per 100,000 inhabitants for each year (1980-2001), per gender and age group. It is observed that, over this period, Tb mortality rates have decreased from 5.9 to 3.1, which represents a 47.5% reduction.

Table 1 - Tuberculosis mortality rates (100,000 inhabitants) per gender and age group, Brazil, 1980-2001

Year/age group (years)	Males					Females					Total
	0-9	10-19	20-59	60 and +	Total	0-9	10-19	20-59	60 and +	Total	
1980	1.9	0.8	11.5	37.7	8.1	1.7	0.8	4.9	13.9	3.7	5.9
1981	1.8	0.8	10.3	31.4	7.2	1.4	0.8	4.5	12.0	3.4	5.3
1982	1.3	0.6	8.9	27.6	6.2	1.2	0.6	3.8	11.2	3.0	4.6
1983	1.2	0.6	8.3	26.3	5.9	1.0	0.6	3.5	10.0	2.7	4.3
1984	1.1	0.6	8.4	27.3	6.0	1.1	0.6	3.4	9.5	2.7	4.3
1985	1.1	0.5	7.6	25.4	5.5	0.7	0.4	2.9	8.8	2.3	3.9
1986	0.9	0.6	7.7	24.3	5.5	0.6	0.6	2.9	8.0	2.2	3.9
1987	0.8	0.5	7.7	22.1	5.4	0.8	0.4	2.6	8.2	2.2	3.7
1988	0.7	0.5	7.7	23.5	5.5	0.6	0.4	2.8	7.8	2.2	3.8
1989	0.7	0.5	7.7	22.9	5.5	0.6	0.5	2.7	7.2	2.1	3.8
1990	0.7	0.5	7.1	22.1	5.3	0.5	0.5	2.7	7.1	2.1	3.6
1991	0.5	0.4	7.6	20.7	5.3	0.4	0.4	2.5	7.4	2.0	3.6
1992	0.4	0.4	7.2	21.4	5.3	0.4	0.3	2.5	6.8	2.0	3.6
1993	0.4	0.3	7.8	23.5	5.5	0.3	0.4	2.7	7.6	2.1	3.8
1994	0.4	0.3	7.7	26.8	5.7	0.3	0.4	2.8	8.1	2.1	3.9
1995	0.4	0.4	7.6	24.6	5.5	0.4	0.3	2.7	8.6	2.2	3.8
1996	0.4	0.3	7.1	21.3	5.3	0.3	0.3	2.4	7.7	2.0	3.6
1997	0.4	0.4	6.9	23.0	5.4	0.3	0.3	2.4	7.9	2.0	3.7
1998	0.2	0.3	6.9	24.1	5.4	0.3	0.3	2.5	8.1	2.1	3.7
1999	0.2	0.2	6.9	24.0	5.3	0.2	0.3	2.3	8.2	2.0	3.6
2000	0.2	0.3	5.9	20.9	4.8	0.3	0.3	2.0	6.4	1.8	3.3
2001	0.2	0.3	5.7	20.0	4.7	0.2	0.2	1.8	6.8	1.7	3.1

Figure 1 presents the evolution of Tb mortality per gender. For all study years, rates for men were higher (nearly twice) than for women, and this tendency remained the same in the following years. The decrease observed over the 22 analyzed years was approximately 42% for Tb deaths in men and 54% in women. However, a regular downward behavior was not observed over the study years. There were, indeed, sharper decreases in the first and last years of the studied series, as well as a stable behavior throughout the largest part of the analyzed period. No significant decrease in Tb mortality was observed between 1985 and 1998.
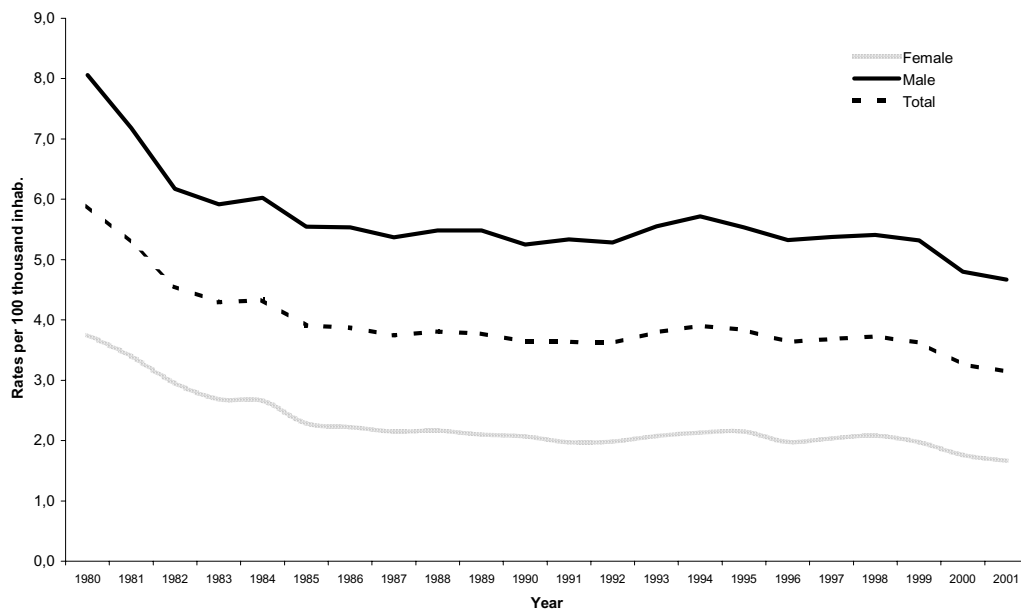

Figure 1 - Tuberculosis mortality rates per gender, Brazil, 1980 to 2001

Rev Latino-am Enfermagem 2007 setembro-outubro; 15(5):936-41
www.eerp.usp.br/rlae

Time series of tuberculosis...
Hino P, Costa-Júnior ML, Sassaki CM, Oliveira MF, Villa TCS, Santos CB.

939

Figure 2 illustrates the evolution of Tb mortality per age group and shows a sharper mortality decrease for people aged 60 or older. However, this behavior was irregular, with a significant decrease throughout the 1980s and inclinations in 1992-1994 and 1996-1998, which were separated by decrease periods. There was a reduction tending to zero for the age groups of 0-9 years and 10-19 years in the final study years. During the period from 1980 to 1985, the Tb mortality rate decreased for the age group 20-59 years, which remained constant in the following years.
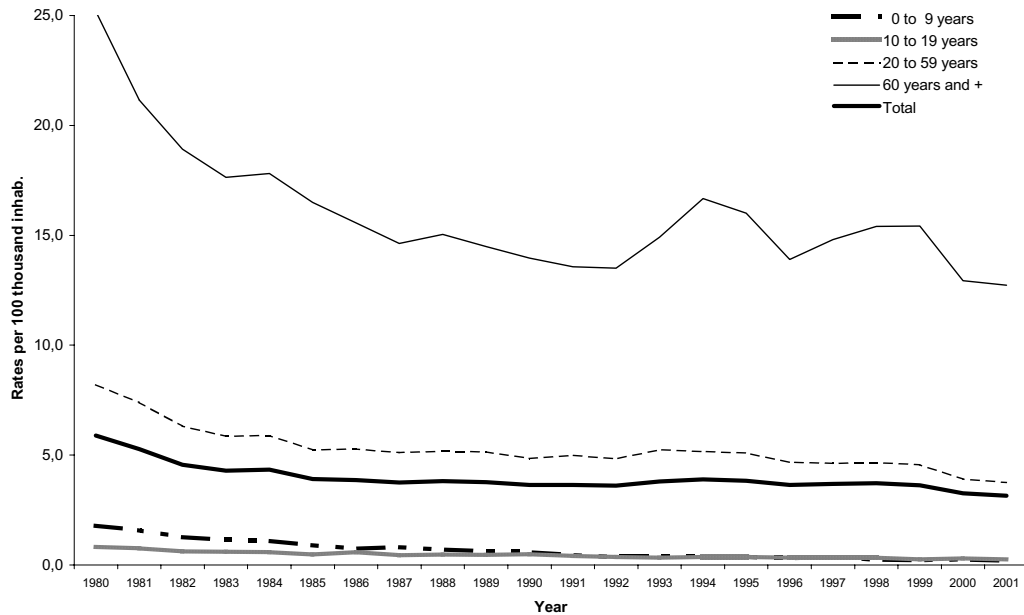

Figure 2 - Tuberculosis mortality rates per age groups, Brazil, 1980 to 2001

Figures 3 and 4 show that Tb death rates in men have always been higher than in women, regardless of the age group. The gender difference in Tb mortality is astonishing. The Tb mortality rate (100,000 inhabitants) for men in 2001 was 5.7 for the age group from 20 to 59 years, and 20 for people aged 60 or older. On the other hand, rates for women were 1.8 and 6.8, respectively.
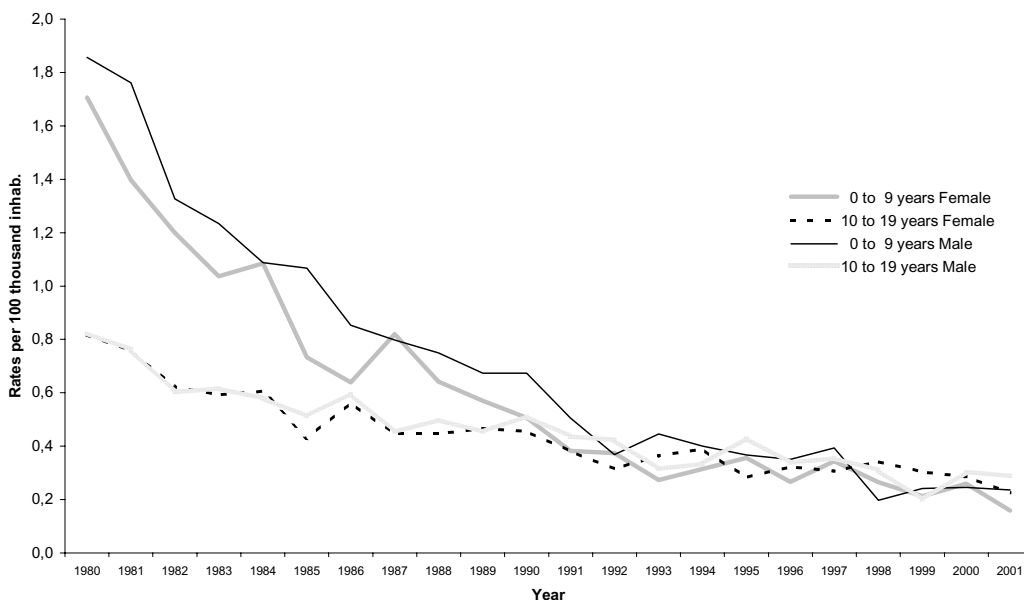

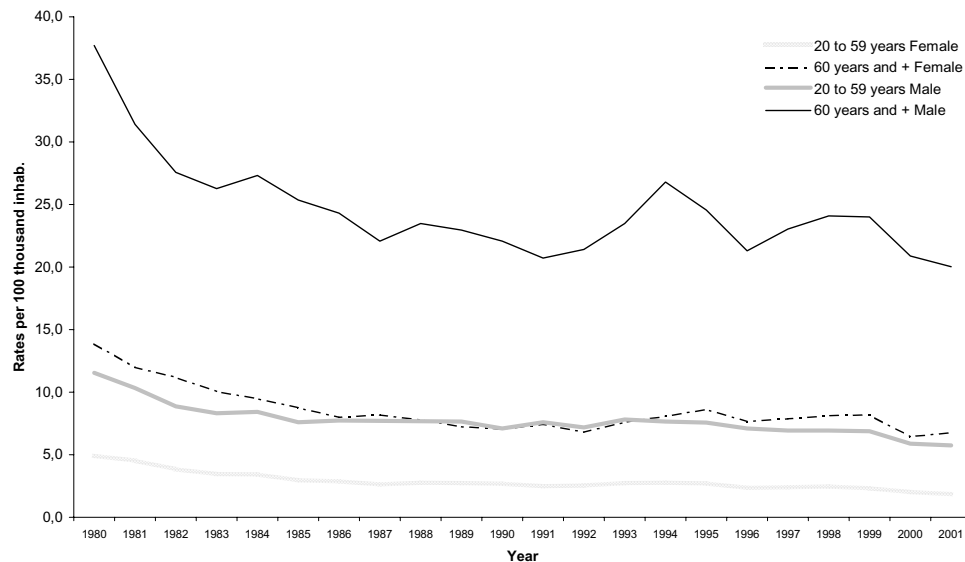Figure 3 - Tuberculosis mortality rates per gender and age groups, Brazil, 1980 to 2001

Time series of tuberculosis...
Hino P, Costa-Júnior ML, Sassaki CM, Oliveira MF, Villa TCS, Santos CB.

Rev Latino-am Enfermagem 2007 setembro-outubro; 15(5):936-41
www.eerp.usp.br/rlae

940

Figure 4 - Tuberculosis mortality rates per gender and age groups, Brazil, 1980 to 2001

DISCUSSION

Despite the decrease in Tb mortality that has occurred over time in Brazil, the country is still distant from developed countries' rates, of about 1/100,000 inhabitants. In 2002, Africa stood out as the country with the highest Tb mortality and incidence rates in the world: 83 deaths and 350 annual cases for each 100,000 inhabitants, respectively[12].

The significant presence of Tb mortality in the elderly could be attributed to the weakness of health care services, as previously observed[13-14]. The Tb death ratio in this specific group is alarming. Possible explanations for this behavior include the growing elderly population, confined to nursing homes, difficult access to health services, taking long to seek medical care, unprepared health professionals about the possibility of this age group having Tb, among other factors that might delay disease diagnosis and often lead to death.

Mortality has been attributed to irregular/inappropriate chemotherapy, late diagnosis, multiple drug resistance and HIV co-infection. Each year, numerous Tb carriers are not identified before their death. These cases represent the health system's failures to detect, diagnose and treat the disease. Deaths are associated with late diagnosis, which is a primary health care organization problem. Since prevention actions as well as the search for symptomatic individuals for case detection have not been incorporated into health professionals' practice,

death rates have increased in vulnerable age groups, such as the elderly and co-infected individuals.

The prevalence of deaths among men found in this study is in agreement with literature[3,15-16]. Men usually take longer to seek health care when compared to women. This could suggest a higher lethality among men. It should also be highlighted that the high prevalence of Tb among men is also ascribed to life habits, including alcohol consumption, a factor strongly associated with Tb. It is also possible that women are more resistant than men and are more health-conscientious.

It is to be considered that one of the main problems in making consistent Tb mortality rate estimates is the availability of reliable information regarding death records. Though mandatory in Brazil, both Tb notification and death records are underreported.

The Tb issue in Brazil reflects the country's development stage, in which determinants of poverty, health system weaknesses and administration deficiencies impair the sustained reduction of a disease marked by the social context. The macroeconomic model has clearly affected the persistence of social inequalities[17] and contributes to maintaining the death chain related to a disease that already has an effective treatment. There have been program actions for over three decades. The persistence of high mortality rates, along with the unequal distribution in the urban environment, reveals health service limitations regarding coverage, quality and equity.

Rev Latino-am Enfermagem 2007 setembro-outubro; 15(5):936-41
www.eerp.usp.br/rlae

Time series of tuberculosis...
Hino P, Costa-Júnior ML, Sassaki CM, Oliveira MF, Villa TCS, Santos CB.

941

Throughout the studied time series, the country has undergone important changes. Regarding Public Health Policies, the implementation of the Single Health System (SHS) in 1988 stands out, which represented a new paradigm in Brazilian health care, either in the political, technological or ideological sense. Like in other countries, fighting Tb is difficult due to low political commitment at different governmental levels, in addition to a reduced involvement of civil society. It is expected that, through the DOTS strategy, mortality levels decrease at a higher rate than the number of cases[18].

Nevertheless, it should be stressed that there is a need for more emphasis on research, focused on encouraging the search for symptomatic individuals, reducing diagnosis time, beginning treatment as soon as possible, appropriately providing antitubercular agents, improving patient care and protecting the health staff from nosocomial Tb.

REFERENCES

1. Kusano MSE, Assis MCM. Tendência da morbi-mortalidade por tuberculose no Distrito Federal - Brasília. Bol Pneumol Sanitária 2002; 10:55-9.

2. Lienhardt C, Ogden JA. Tuberculosis Control in resource poor-countries: have we reached the limits of the universal paradigm?. Trop Med Int Health 2004; 9:833-41.

3. Antunes JLF, Waldman EA. Tuberculosis in the twentieth century: time-series mortality in São Paulo, Brazil, 1900-97. Cad Saúde Pública 1999; 15:463-76.

4. Ruffino-Netto A. Tuberculose: a calamidade negligenciada. Rev Soc Bras Med Trop 2002; 35:51-8.

5. Ministério da Saúde(BR). Plano Nacional de Controle da Tuberculose. Brasília (DF): Ministério da Saúde; 1999.

6. Brasil. Ministério da Saúde. Sistema de Informação de Agravos de Notificação. Área Técnica de Pneumologia Sanitária. Brasília; 2004.

7. Mota FF, Silva LMV, Paim JS, Costa MCN. Distribuição espacial da mortalidade por tuberculose em Salvador, Bahia, Brasil. Cad Saúde Pública 2003; 19:915-22.

8. Harries AD, Hargreaves NJ, Kemp J, Jindani A, Enarson DA, Maher D et al. Deaths from tuberculosis in sub-Saharan African countries with a high prevalence of HIV. Lancet 2001; 357:1519-23.

9. Ministério da Saúde(BR). Controle da Tuberculose: uma proposta de integração ensino-serviço. Rio de Janeiro(RJ): Ministério da Saúde; 2002.

10. World Health Organization. Tuberculosis control: Surveillance, Planning, Financing. WHO Report 2005; 349.

11. Suárez P, Watt CJ, Alarcon E, Portocarrero J, Zavala D, Canales R et al. The dynamics of tuberculosis in response to 10 years of intensive control effort in Peru. J Inf Diseases 2001; 184:473-8.

12. Saúde em mapas e números. Eurotrials Bol Informativo [periódico na Internet] 2004 set [citado 20 de setembro de 2005]; (15): [4 telas]. Disponível em: http://www.eurotrials.com .

13. Chaimowicz F. Age transition of Tuberculosis incidence and mortality in Brazil. Rev Saúde Pública 2001; 35:81-7.

14. Mishima EO, Nogueira PA. Tuberculose no idoso: estado de São Paulo, 1940-1995. Bol Pneumol Sanitária 2001; 9:5-11.

15. Selig L, Belo M, Cunha AJLA, Teixeira EG, Brito R, Luna AL et al. Óbitos atribuídos à tuberculose no Estado do Rio de Janeiro. J Bras Pneumol 2004; 30: 417-24.

16. Hino, Santos, Villa, Muñiz, Monroe. Tuberculosis patients submitted to Supervised Treatment. Ribeirão Preto- São Paulo-Brazil. 1998 and 1999. Rev Latino-am Enfermagem 2005 janeiro-fevereiro; 13(1):27-31.

17. Caldeira AP, Franca E, Perétuo IHO, Goulart EMA. Evolução da mortalidade infantil por causas evitáveis, Belo Horizonte, 1984-1998. Rev Saúde Pública 2005; 39:67-74.

18. Muniz JN, Villa TCS. O impacto epidemiológico do Tratamento Supervisionado no controle da Tuberculose em Ribeirão Preto, 1998-2000. Bol Pneumol Sanitária 2002;10:49-54.