

Heart Failure Mortality Trend in Salvador, Bahia, Brazil

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OBJECTIVE

To assess mortality trend due to heart failure (HF) in Salvador - Bahia, from 1979 to 1995.

METHODS

HF was defined by notations from the 9th Review of International Disease Code (ICD9) 428.0, 428.1 and 428.9. HF death and population data (metropolitan area of Salvador) were obtained by means of Secretaria de Saúde da Bahia (Bahia State Health Secretariat) and Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics). Mortality rates (/ 100,000) were total or per gender and age, and gross or adapted per age (straight standardization).

RESULTS

Mortality rates due to HF had a progressive reduction in the period of time assessed, for both genders, especially up to 1992. From then and up to 1995, there was an apparent stabilization of the curves. Gross mortality rate went from 25.0/10⁵, in 1979, to 16.4/10⁵ inhabitants, in 1995 (a decrease of 34.4%). The reduction was 34.0% (23.3/10⁵, in 1979, to 15.4/10⁵ inhabitants, in 1995) for male sex and 35.2% (26.7/10⁵, in 1979, to 17.3/10⁵ inhabitants, in 1995), for female sex. The same trend took place in several age ranges, including the population ³ 40 years old, which has a greater risk for HF. After adaptation per age (standard population of 1979), it is observed that relative reductions in the rates were even greater.

CONCLUSION

Mortality due to HF, in Salvador-Bahia, decreased from 1979 to 1992, becoming stable from then to 1995.

KEY WORDS

heart failure, mortality, epidemiology

Heart failure (HF) is a limiting chronic disease, which has constituted in the main cause for hospitalization among patients older than 65 years of age, especially in developed countries¹⁻³. Today, the disease is a public health problem, associated to high cost and a growing number of hospital admissions. Recent evidences have pointed out in favor to an increase in the proportion of patients with heart failure⁴, which is susceptible to stress in the future, as long as improvements in mortality rates due to circulatory diseases, such as heart ischemic disease and systemic hypertension, the number of individuals vulnerable to development of congestive heart failure² will increase. The progressive aging of the population can also independently contribute for the increase in the number of patients with that condition^{2,5}.

Despite the implementation, in the last years, of effective therapeutic strategies in reducing lethality of heart failure patients⁶⁻⁸, mortality rates due to the disease have remained high. In the United States, a study suggests that age-adjusted mortality rates due to heart failure increased during the period from 1980 to 1988, with a further decrease of them from 1988 until the year 1995¹. In another American study, Baker et al⁹, on the other hand, described an improvement of mortality rates after one year of hospital discharge. In Spain, global mortality rates due to heart failure seemed unchanged between 1980 and 1993⁴.

In Brazil the studies are scarce. Mansur et al described a reduction in mortality rates due to circulatory diseases in Brazil, from 1979 to 1996, and for heart ischemic disease, the decrease in the rates was almost twice as higher for male sex individuals in comparison to female sex patients¹⁰. When assessing the mortality trend due to circulatory diseases, according to the five Brazilian regions, in that same period, the findings were as follows: mortality reduction for both sexes in the South, Southeast and North regions, and an increase in mortality rates in the Northeast and Central-West ones, except for the population between 30 to 39 years old¹¹. Up to this moment, there have not been published data on mortality trend due to congestive heart failure in Brazil.

The objective of the present study is to assess mortality trend due to congestive heart failure in the city of Salvador-Bahia, in the period from 1979 to 1995.

METHODS

For the purposes of this study, heart failure was defined by using the following notations from the 9th Review of International Disease Code (ICD9): 428.0 (*congestive heart failure*), 428.1 (*left heart failure*) and 428.9 (*non-specified heart failure*). Only codes corresponding to the basic cause of death were considered. Death data were obtained through the Sistema de Informações sobre Mortalidade e Nascidos Vivos – System of Information on Mortality and Born Alive – (SIMSINASC) of Secretaria de Saúde da Bahia (SESAB), Ministério da Saúde. Data

on total deaths and stratified per gender and age ranges, referring to the period from 1979 to 1995 were provided. Data of deaths due to Chagas' Disease with heart compromising (ICD9 086.0) were also obtained for comparison purposes, and in this text, the disease will be referred as chronic chagasic myocarditis (CCM).

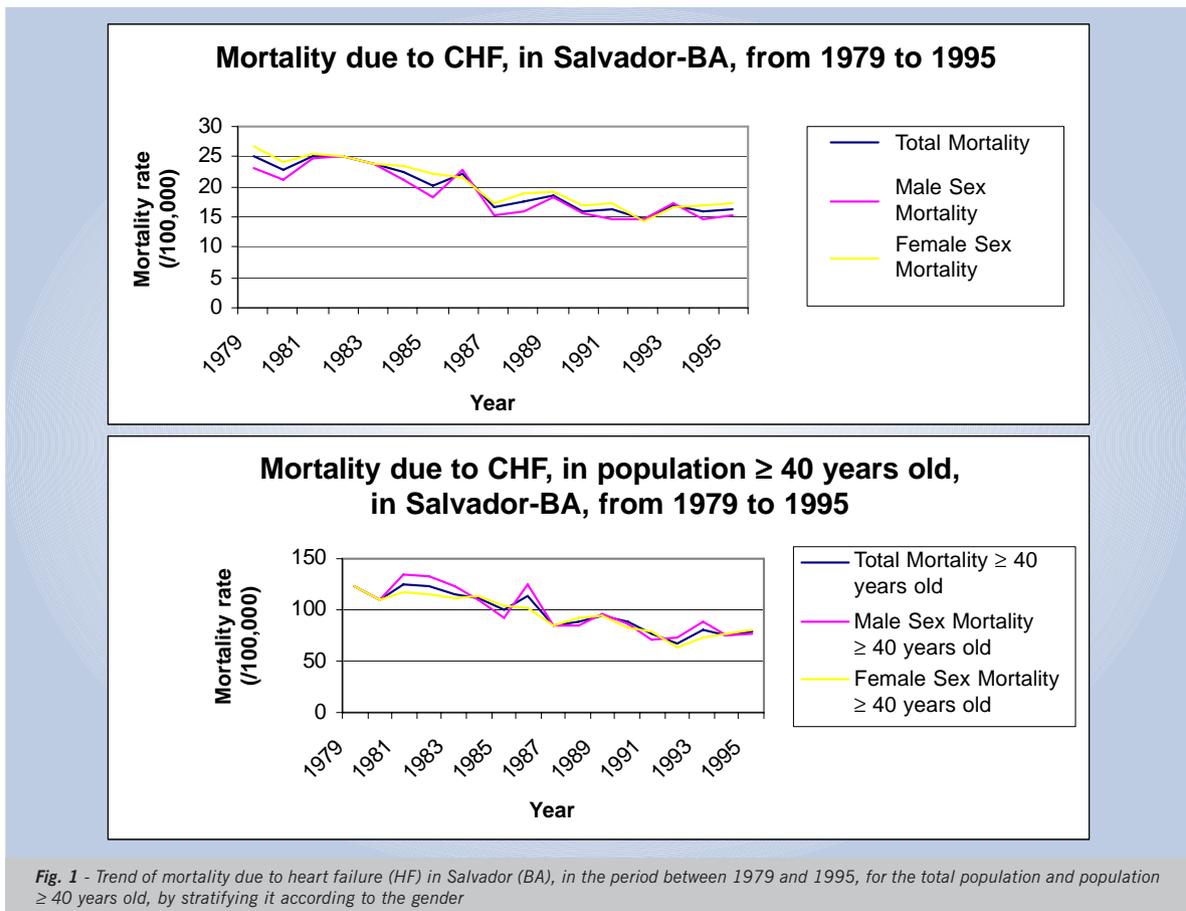
Populational data were supplied by SESAB and by the Instituto Brasileiro de Geografia e Estatística (IBGE), corresponding to the same period of time. Figures referred to the metropolitan area of Salvador, which includes ten cities: Salvador, Camaçari, Candeias, Dias D'Ávila, Itaparica, Vera Cruz, Simões Filho, Lauro de Freitas, São Francisco do Conde and Madre de Deus. Total data and those stratified per gender and age ranges were made available.

Total and per gender mortality rates due to heart failure (and due to Chagas' Disease), were calculated by 100,000 inhabitants. Rates were also stratified per age, by initially using the < 40-year-old and ≥ 40-year-old groups. The population ≥ 40 years old, representing the group with the highest risk of developing heart failure, was further categorized in the following age ranges: 40 to 49, 50 to 59, 60 to 69 and ≥ 70 years old. Mortality rates were calculated as gross and age-adapted rates, through direct method. The population for the metropolitan area of Salvador, in 1979, was regarded as a standard population for the process of age adaptation.

Simple linear regression models were used for obtaining beta coefficients, by analyzing mortality as a dependent variable and the year as independent variable.

RESULTS

In the metropolitan area of Salvador, mortality rates due to heart failure showed a progressive reduction in the assessed period of time, for both genders, especially up to 1992. From then and until 1995, an apparent stabilization of the curves takes place, which can also be seen in the gender stratified charts (fig. 1). For the total population, the gross mortality rate went from 25.0/10⁵, in 1979, to 16.4/10⁵ inhabitants, in 1995, corresponding to a reduction of 34.4%. For male sex individuals, the relative reduction was 34.0% (23.3/10⁵, in 1979, to 15.4/10⁵ inhabitants, in 1995), very similar to that observed among female sex individuals (26.7/10⁵, in 1979, to 17.3/10⁵ inhabitants, in 1995, a decrease of 35.2%). Gross mortality curves for population with higher risk for heart failure, which means, age ≥ 40 years old, showed the same trend as those from the total population, in both genders (fig. 1). When the rates were stratified through previously described age ranges, a trend for progressive fall of them in the time interval studied was observed again, notably until 1990-1991. From 1991-1992, a stabilization of the curves is noted, as was seen for the total population. Still concerning charts referring to specific rates per age, a greater variability in the curves in relation to those from the total population is noted, as well as a superiority in mortality rates among male sex



individuals in relation to female sex ones, especially in age ranges of 60-69 years old and ≥ 70 years old (fig. 2).

After the standardization of mortality rates per age, it is observed that the above described trend is constant (fig. 3), and the relative reductions occurred in the period were even greater than those observed in gross rates. Adapted mortality rate for the total population decreased from $22.5/10^5$ to $12.5/10^5$ inhabitants, from 1980 to 1995, which corresponded to a reduction of 44.4%. Among male sex individuals, the adapted rate went from $20.9/10^5$ to $11.3/10^5$ inhabitants (a decrease of 45.9%) and, in female sex patients, the decrease was from $24.0/10^5$ to $12.8/10^5$ inhabitants within the same period (a reduction of 46.7%).

Through the simple linear regression analysis of mortality rates along the time, it was possible to estimate a yearly average of the decrease of mortality due to CHF, in the metropolitan area of Salvador, which was of approximately $0.9/10^5$ inhabitants/year. That value was similar for the gross and adapted curves corresponding to total, male and female populations.

Concerning mortality rates due to CCM, in Salvador, it is observed that they also decreased from 1979 to 1995, although relative reductions have been lower than those obtained with mortality due to heart failure. Reduction of mortality due to CCM was more stressed for male sex

individuals, in which absolute values of rates were also higher. Total mortality due to CCM reduced from 9.63, in 1979, to $7.18/10^5$ inhabitants, in 1995, which corresponded to a decrease of 25.4%. Among male sex individuals, the reduction was approximately 29.2% (12.94 , in 1979, to $9.16/10^5$ inhabitants, in 1995), much higher than the decrease of 18.1% observed in female sex individuals (6.58 , in 1979, to $5.39/10^5$ inhabitants, in 1995). It is interesting to note that, in the population with age under 40 years old (fig. 4), relative reductions in mortality rates were well higher than those observed for the total population, even after stratification per gender (decreases of 65%, 61% and 72% for total population, male and female sex individuals, respectively).

DISCUSSION

The present study shows that mortality due to heart failure, in the metropolitan area of Salvador, Bahia, decreased progressively between 1979 and 1992, stabilizing its rates from then to 1995. Such trend took place similarly for both genders, as well as it was kept even after the rate adaptation process per age, by adopting the population of Salvador, in 1979, as standard population. In fact, relative reduction in mortality was even greater in adapted curves than in gross ones.

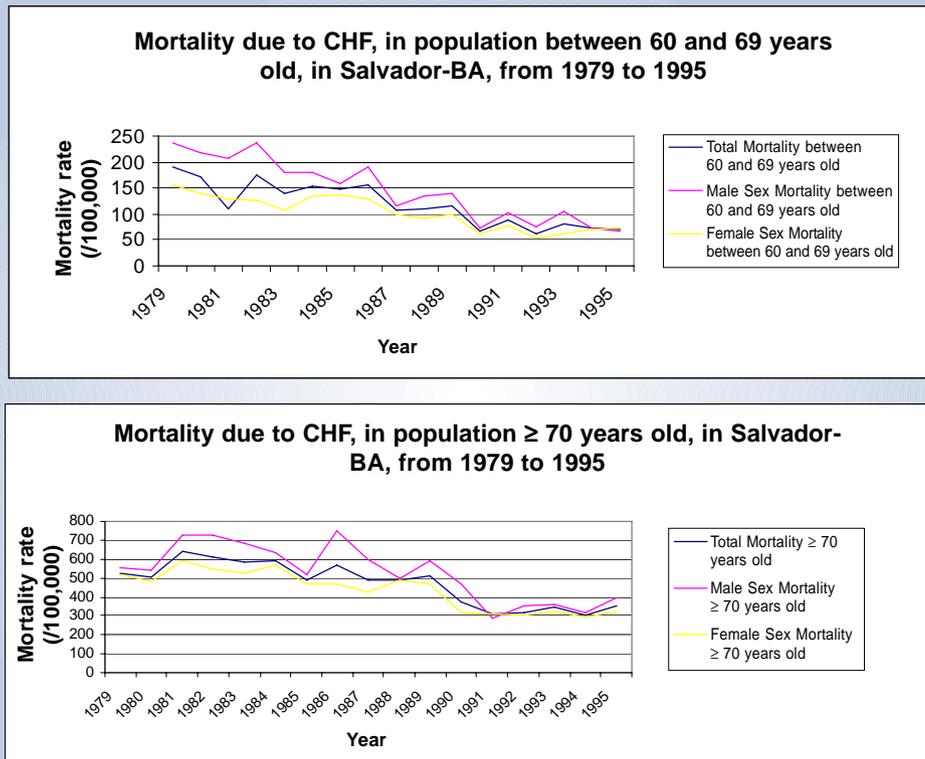


Fig. 2 - Trend of mortality due to heart failure (HF) in Salvador (BA), in the period between 1979 and 1995, for populations between 60 and 69 years old and ≥ 70 years old, by stratifying it according to the gender

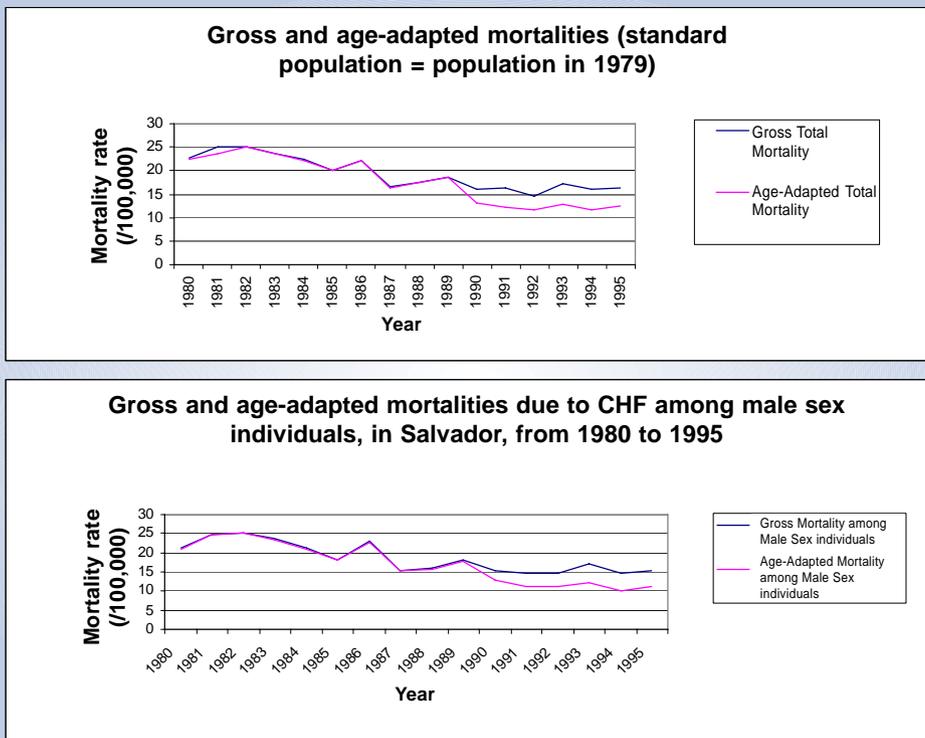


Fig. 3 - Comparison between gross and age-adapted curves, of mortality due to heart failure (HF) in Salvador (BA), for total population and male and female genders

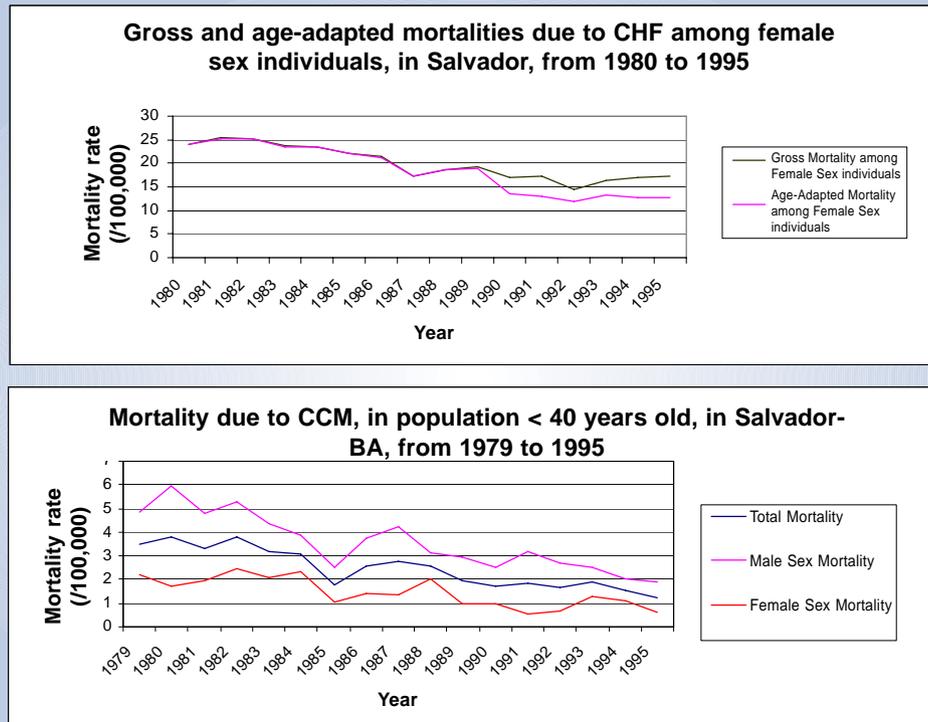


Fig. 4 - Trend of mortality due to chronic chagasic myocarditis (CCM) in Salvador (BA), in the period between 1979 and 1995, for the population < 40 years old, by stratifying it according to the gender

Those findings agreed with results from other literature works, such as, for instance, the study by Martinez et al³, in which a decrease in mortality rates por heart failure in Spain, from 1977 to 1998, for both genders, even after age adaptation, was described. The reduction was about 40% in male sex and 30%, among female sex individuals. Likewise, Rodríguez-Artalejo et al⁴, assessing the population ≥ 45 years old, in the period from 1980 to 1993, found a decrease in age-adapted mortality rates due to heart failure of approximately 23% (30.9% among men and 17.5% among women). In Canada and Singapore, there are also data suggesting a decrease in mortality due to heart failure, in time periods included in the last 20 to 25 years^{2,12,13}.

Feldman et al⁵, for their turn, did not find significant changes in mortality due to heart failure between 1990 and 1997, in the population of Montreal (Canada). In the United States, however, an increase of age-adapted mortality rates due to heart failure in the population ≥ 65 years old, during 1980 to 1988 was described, followed by a decrease of them in the period from 1988 to 1995¹.

Reduction of mortality due to heart failure, found in the metropolitan area of Salvador, may reflect some improvements in the treatment of patients with such condition, occurred in the last decades. A greater ease of access to healthcare services, as well as the increase of patient survival by means of a growing use of angiotensin converting enzyme inhibitors⁶ are examples of that. In

that same context, advancements in the treatment of the main basic causes of heart disease, as heart ischemic disease and hypertension, also contribute to the reduction of the syndrome lethality¹⁴.

An interesting aspect verified in this study was the behavior of mortality due to chagasic cardiopathy (ICD9 086.0) in the same period. Despite not being part of the purpose of this work, those data were computed, secondarily, facing the epidemiological importance of that condition in our milieu. In accordance to findings for heart failure, mortality due to chagasic cardiopathy reduced between 1979 and 1995, in the whole population (25%) and for both genders (a decrease of 29% among male sex individuals and 18%, in female sex ones). However, there was a more significant decrease of mortality in the subgroup with age under 40 years old (reductions of 65%, 61% and 72% for total population, male sex and female sex individuals, respectively), probably due to the fact that this is the age range with the greatest risk to acquire Chagas' Disease.

Some limitations must be taken into account in understanding the results and in obtaining conclusions, as that they are partly inherent to available data themselves. First, the definition of heart failure is not always accurate or of easy agreement among observers, making mortality statistics not properly precise. In that context, the selection of codes to represent the disease is included. The choice of only three more general ICDs,

without reference to a specific etiology, was arbitrary, but based on a thorough analysis of the existing studies on the subject^{1,5,13}. Variations in the codes used to define the disease surely limit comparability of results among studies. A second limitation is that the use of only the basic death cause, as data source of mortality due to heart failure, produces probably underestimated rates, as heart failure has a 5 to 6 times greater chance to be referred as secondary cause of death, and not the primary one, in death certificates¹. Another very important matter is about the quality of death certificates issued in Bahia, or in Salvador, concerning the representativeness of their information. Data quality may be assessed through the structure of mortality due to cause, which reflects the accurate diagnosis and the correct filling out of Basic Causes of death by medical professionals. Problems that make those actions difficult generate a high number of deaths due to unknown or badly defined causes. In this context, despite that, in Bahia, deaths due to badly defined

causes represent a high percentage of certified deaths (average of 31%, between 1999 and 2002)¹⁵, in Salvador, the proportion of those deaths is much lower, located at about 3.2% from total deaths, in 2001¹⁶, comparable to the other Brazilian capitals.

Despite such restrictions, it is important the establishing of local mortality statistics, as they contribute for the understanding of health level of the population and provide information for the planning, management and assessment processes of policies and actions healthcare awareness of many populational segments. It is important to emphasize that, even that absolute numbers of deaths attributed to heart failure, at a certain time, may be questioned, the trend of its mortality reduction observed in Salvador, which was present in both genders and in all age ranges, probably corresponded to reality. And that is consistent to the implementation, in the last decades, of healthcare practices able to improve survival of patients with heart failure.

REFERENCES

- Centers for Disease Control and Prevention. Changes in mortality from heart failure - United States, 1980-1995. *JAMA* 1998; 280: 874-5.
- Ng TP, Niti M. Trends and ethnic differences in hospital admissions and mortality for congestive heart failure in the elderly in Singapore, 1991 to 1998. *Heart* 2003; 89: 865-70.
- Martínez RB, Isla JA, Albero MJM. Mortalidad por insuficiencia cardíaca em Espana, 1977-1998. *Rev Esp Cardiol* 2002; 55: 219-26.
- Rodríguez-Artalejo F, Guallar-Castillon P, Banegas Banegas JR, del Rey Calero J. Trends in hospitalization and mortality for heart failure in Spain, 1980-1993. *Eur Heart J* 1997; 18: 1771-9.
- Feldman DE, Thivierge C, Guerard L et al. Changing trends in mortality and admissions to hospital for elderly patients with congestive heart failure in Montreal. *CMAJ* 2001; 165: 1033-6.
- The SOLVD Investigators. Effect of enalapril on survival in patients with reduced left-ventricular ejection fractions and congestive heart failure. *N Engl J Med* 1991; 325: 293-302.
- Waagstein F, Bristow MR, Swedberg K et al. Beneficial effects of metoprolol in idiopathic dilated cardiomyopathy. Metoprolol in Dilated Cardiomyopathy (MDC) Trial Study Group. *Lancet* 1993; 342: 1441-6.
- MERIT-HF Study Group. Effect of metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL Randomised Intervention Trial in Congestive Heart Failure (MERIT-HF). *Lancet* 1999; 353: 2001-7.
- Baker DW, Einstadter D, Thomas C, Cebul RD. Mortality trends for 23,505 Medicare patients hospitalized with heart failure in Northeast Ohio, 1991 to 1997. *Am Heart J* 2003; 146: 258-64.
- Mansur AP, Favarato D, Souza MFM, Avakian SD, Aldrighi JM, César LAM. Tendência do risco de morte por doenças circulatórias no Brasil de 1979 a 1996. *Arq Bras Cardiol* 2001; 76: 497-503.
- Souza MFM, Timerman A, Serrano Jr CV, Santos RD, Mansur AP. Tendência do risco de morte por doenças circulatórias nas cinco regiões do Brasil, no período de 1979 a 1996. *Arq Bras Cardiol* 2001; 77: 562-8.
- Brophy JM. Epidemiology of congestive heart failure: Canadian data from 1970 to 1989. *Can J Cardiol* 1992; 8: 495-8.
- Brotons C, Moral I, Ribera A et al. Tendencias de la morbimortalidad por insuficiencia cardíaca em Cataluña. *Rev Esp Cardiol* 1998; 51: 972-6.
- The CAST Investigators. Cardiac Arrhythmia Suppression Trial. *N Engl J Med* 1989; 321: 406-12.
- Mortalidade – Notas Técnicas. Disponível em http://tabnet.saude.ba.gov.br/cgi/tabnet/sim/NT_Mort.htm. Acesso em: 8 de setembro de 2003.
- Mortalidade – Bahia. Disponível em <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sim/cnv/obtba.def>. Acesso em: 28 de julho de 2004.