# ESTUDO DA MORTALIDADE DOS MÉDICOS NO ESTADO DA BAHIA, BRASIL, NO PERÍODO 2008-2017

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**Resumo**

Introdução: O estudo de mortalidade é utilizado para a avaliação e acompanhamento de programas de saúde em todo o mundo. Apesar de sua importância, estudos de mortalidade em grupos sociais específicos, como médicos, são escassos no mundo todo, incluindo o Brasil. Objetivo: Nosso objetivo foi descrever e analisar o perfil de mortalidade de médicos no estado da Bahia durante um período de dez anos (2008-2017). Métodos: Estudo descritivo, analítico e retrospectivo, analisando todas as causas de óbito segundo a CID-10. As análises categóricas utilizadas foram estado civil, etnia, idade, sexo e causa da morte. Resultados: Entre os médicos baianos, ocorreram 489 mortes no período, a maioria entre os homens (84%), que ocorreu em idades mais avançadas. Houve predomínio de pessoas brancas em ambos os sexos. As três principais causas de morte foram doenças do aparelho circulatório (28%), neoplasia (27%) e causas externas (12%). Esse padrão foi o mesmo entre a população masculina, mas as neoplasias foram a causa mais comum de morte entre as mulheres. O coeficiente de mortalidade da população médica é cerca da metade da população total, podendo refletir a grande expansão da população médica brasileira nos últimos anos. Conclusão: Os achados mostram fatos e tendências que podem contribuir para o entendimento da mortalidade entre médicos na Bahia, Brasil.

**Palavras-chave**: Causas da Morte;  Registros de mortalidade; Mortalidade Ocupacional; Médicos.

## STUDY OF DOCTOR MORTALITY IN THE STATE OF BAHIA, BRAZIL, 2008-2017

**Abstract**

Introduction: The mortality study is widely used for the evaluation and follow-up of health programs around the world serving as an important tool to measure the efficiency of health programs besides serving as a parameter for the application of new health strategies that may have positive impacts health status of the population. Despite its importance, mortality studies in specific social groups such as physicians have been scarce in the world, including in Brazil. Aim: Here, our aim was to describe and analyze the mortality profile of physicians in the state of Bahia during a period of ten years (2008-2017). Methods: A descriptive, analytical and retrospective study was performed by analyzing all causes of death according to ICD-10. The categorical analyzes used were marital status, ethnicity, age, gender, and cause of death. Results: Among Bahian physicians, there were 489 deaths in the period, most among men (84%) which occurred in older ages. There was a predominance of white people in both sexes. The top three causes of death were diseases of the circulatory system (28%), neoplasia (27%) and external causes (12%). This pattern was the same among male population, but neoplasms were the most common cause of death among women. The coefficient of mortality of the medical population was about half of the total population, being able to reflect the great expansion of the Brazilian medical population in recent years. Conclusion: These findings show facts and tendencies which may contribute for the understanding mortality among physicians in Bahia, Brazil.

**Keywords**: Causes of Death; Mortality records; Occupational mortality; Physicians.

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# 1 INTRODUCTION

Mortality rate analysis is used to evaluate health programs around the world and serves as an important tool to measure the efficient of current health programs or to conduct new strategies that could impacts in the health system (JORGE; LAURENTI; GOTLIEB, 2007). Despite its importance, mortality studies in a specific group like physicians has been scarce in the world, including in Brazil, a huge country with 27 states and a large territory. This type of study has been only realized in two Brazilian states located in south and southeast regions, both with high income (POMPERMAIER, 2009; SANCHEZ et al., 2013).

Physicians, in general, have substantial knowledge about health and they have a higher socioeconomic level at least in Brazil (FRANK, 2004). Other countries such as Norway and the United States, however, have carried studies in this area that contributed to the understanding which mechanism are enrolled with these population and elaborate specifics policies in these group (AASLAND et al., 2011; CARPENTER; SWERDLOW; FEAR, 1997; FRANK; BIOLA; BURNETT, 2000).

Aasland et al. 2011 reported that between 1960 and 2000 in Norwegian, the physicians mortality rates were lower than general population, except by suicide rates (AASLAND et al., 2011). Similarly, study conducted by Frank et al. 2006 showed that the American physicians died more at advanced age when compared to other professionals in the general population. Investigating the causes of death, Frank reveals similarities with the general population, but there was an increase number of cerebrovascular occurrences followed by accidents and suicide (FRANK; BIOLA; BURNETT, 2000).

Mortality studies can lead to develop important programs, which are scarce in Brazilian physician population. In this sense, this study aims to describe and analyze the mortality of physicians in the state of Bahia from 2008 to 2017 and it may contribute to promote improvements in life quality, awareness and prevention of morbidities associated with medical mortality in the state.

## 2 MATERIALS AND METHODS

This study is an epidemiological, retrospective, descriptive and analytical study, which uses data obtained through the Regional Council of Medicine in the State of Bahia (CREMEB) and the website of the Health Surveillance Superintendence (SUVISA).

The study population included physicians enrolled in CREMEB who died in during 2008-2017 and the overall physicians who have active registry in the Regional Council. The data were requested and kindly provided by CREMEB by the request letter (official letter 11.155/2018). The whole population data were accessed through the SUVISA website, where the cases of specific deaths of physicians in the state of Bahia were selected by the years 2008 from 2017.

For the analysis of causes of death, we considered the International Classification of Diseases, 10th revision (ICD-10) and grouped the diseases in 14 large groups (circulatory system, neoplasms, external causes, respiratory system, digestive system, endocrine system, nervous system, infectious diseases, genitourinary system, others, musculoskeletal system, mental diseases, blood diseases and skin diseases).

The coefficient of mortality was calculated with the ratio between number of deaths in physician population and the number of professionals enrolled in CREMEB in the evaluated period (2008-2017). The mortality coefficient of the general population of Bahia was calculated from the ratio between number of live people and the number of deaths in the years evaluated from the SUVISA data, subtracting the physicians.

Other variables evaluated, were: marital status, ethnicity, gender, health region, year of the death, age and cause of death. For the categorical data, the chi-square test or the Fisher's exact test was used considering a 5% α and a statistically significant p value $<0.05$. For the correlation of deaths and period, the Spearman rank correlation coefficient was used. Since the present study was conducted using secondary data and were not possible to identify the patients the study did not require the application of the informed term of consent.

## 3 RESULTS

Between 2008 and 2017 occurred 489 deaths of physicians in the state of Bahia. It represents 412 (84%) of males followed by 77 (16%) females. The number of deaths were

increasing during the years starting with 35 (6.95%) in 2008 to 83 (16.97%) in 2017. The committed status had a predominance of married doctors with 289 (59%) and a predominance of Caucasian doctors with 327 (67%) who resided in the capital 289 (59.1%). The most prevalence age intervals was above 60 representing 78.9% of the active medical population in the period studied (Table 1).

The trends analysis between each gender depicted a positive significant correlation coefficient $r = 0.758$ (p=0.015) in males doctors and a positive significant correlation coefficient $r = 0.720$ (p=0.023) in females. The mean number of deaths during the period studied for male sex was 41.2 deaths and it was 5.3 times higher than the number of female deaths with an average of 7.7 deaths (Figure 1).

Figure 1 - Linear trend in the number of physicians died during 2008 to 2017 segregated by gender in state of Bahia. In Black is depicted the total number of males and in grey the number of females. Spearman correlation was used to investigate the correlations between the numbers of deaths in the period.
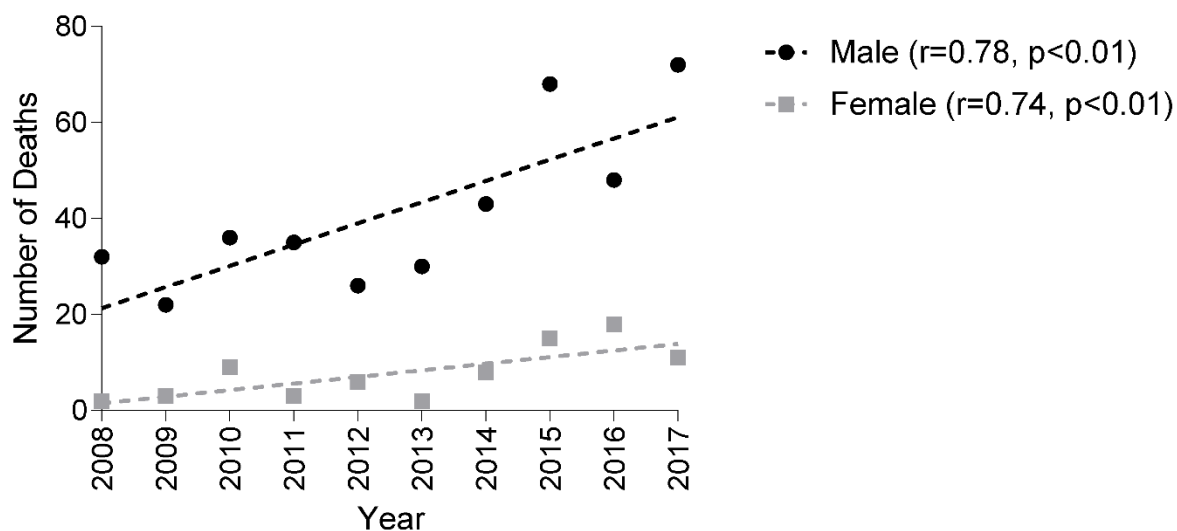


Furthermore, we investigated the proportion of deaths between both genders. Stratifying sex and age into different strata, we found two distinct patterns: The male physicians mostly died in the age group above 80 years, while the women died earlier, in the age group between 60 and 69 years. This difference was statistically significant (p=0.0074) (Figure 2).

Figure 2 - Differences in the proportion of age between gender male and female. For analysis of the frequency of males and females in each age strata were used in a Chi-Square test. (**) p<0.01.
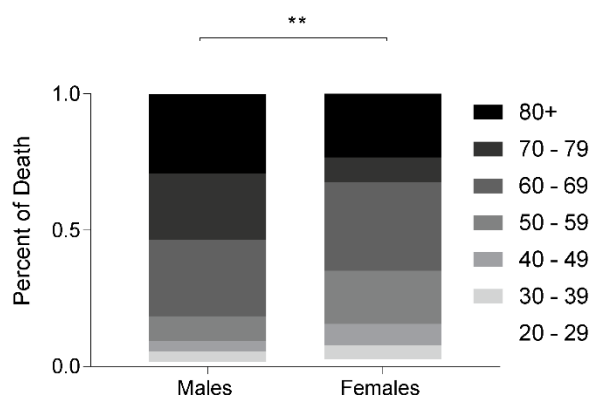


The analysis of all causes of death showed that, in males, there was a predominance of diseases of the circulatory system (31.55%), followed by neoplasms (26.46%) and deaths due to external causes (10.68%). On other hand, in females, neoplasm was the main cause of death (33.77%), followed by external causes (22.08%) and diseases of the circulatory system (10.39%). This result was compared by chi square test and it was significant with p-value of p = 0.0002 (Table 2).

After understanding how deaths are distributed in the physician population, we investigated the mortality rate (per thousand) between physicians in the State of Bahia of each gender. The mortality rate of physicians ranged between 1.66 in 2009 to 4.2 in 2015, while the mortality rate of general population ranged from 4.93 in 2008 to 5.87 in 2017. Although the mortality rates between the physicians and general population floated over a decade, it had no statistical significance. It is interesting to note, however, that the physician´s rates were always lower than the general population rate. Furthermore, among physicians, when we compare gender, the variation observed in female doctors (5.8) was 2.4 times higher than the male (2.44) (Table 3).

## 3 DISCUSSION

The State of Bahia is the most representative state of the Northeast region with a huge population of more than 14 million people and it is the 4th most populous state in the country. In

relation to physicians, Bahia in 2018, had a total of 20,708 accumulated active professionals in CREMEB and it represents a rate of about 1.35 doctors per thousand inhabitants. The present study assesses, for the first time, the profile of medical class deaths in Bahia state and allow us to understand the current panorama of deaths in medical doctors in the state and it may be useful for the implementation programs and policies for this professional class.

We found a predominance of males (84%), white individuals (67%) living in the capital (59%). Regarding the predominance of deaths in the capital, although Salvador accounts for 19% of the total population of the State, it is reported that there is a trend towards the maintenance of medical professionals in regions that offer more opportunities and specialization programs which, in general, occurs in Brazilian capitals (PÓVOA; ANDRADE, 2006). The prevalence of male deaths is explained by, historically, there is a higher proportion of male participation in the medical profession. In addition, males deaths could be associated with a lack of prevention and care of men with him own health with a greater exposure to risk factors, mainly to deaths due to external causes, which in this study were approximately three times greater than in the female sex (ABREU; CÉSAR; FRANÇA, 2009; MOURA et al., 2015; SALA; MENDES, 2010; SCHRAIBER; GOMES; COUTO, 2005). Regarding ethnicity, although the Brazilian northeast is predominantly composed of black individuals (OLIVEIRA et al., 2019), the fact that there is still a great ethnic inequality in Brazil in access to higher education (GISI., 2006) explains why we recognize a population of medical professionals composed mainly of white individuals and, therefore, we can found more deaths in this ethnic group.

Two other already available and accessible studies on the mortality of physicians in Brazil also evidenced this preponderance of deaths of male physicians. One study from Santa Catarina State analyzed the mortality of physicians between 1996 and 2008 and found 252 deaths, of which 228 were males, representing 90.5% of the total number of medical deaths (POMPERMAIER, 2009). In the other study, Sanchez et al. investigated 2927 physicians who died from 2000 to 2009 in the state of São Paulo, of which 2540 of those physicians were males, represents 86.8% of total medical deaths in that period (SANCHEZ et al., 2013).

It is interesting to note that over the years there has been an increase in the number of deaths of female physicians. In the year 2008, beginning of the study period, 5.8% of deaths were representative of female population, increasing to 27.2% in 2016. This observation may be related to the already well-described and growing feminization of Medicine school (MACHADO,

2003; SCHEFFER et al., 2013). Likewise, this may be the reason why we find a higher number of medical deaths in lower age groups, whereas in older age groups, deaths of medical men predominate.

Corroborating with the afore mentioned data, mortality studies of the Brazilian population showed a predominance of male deaths in the older age groups, 60 to 79 years, similar to the data obtained in this study (LAURENTI; JORGE; GOTLIEB, 2005; SALA; MENDES, 2010). In the other two studies of the same subject, the deaths of female physicians are also concentrated in lower age groups when compared to those of male physicians (POMPERMAIER, 2009; SANCHEZ et al., 2013).

Among the causes of death in the medical population, the three main causes were diseases of the circulatory system (28%), neoplasms (27%) and external causes (12%), which is similar to national epidemiological data (NOGUEIRA, 2004). Interestingly, when stratifying by sex, we noticed that males had the same order of distribution with a very similar pattern: diseases of the circulatory system (31%), neoplasm (26%) and external causes (10%), but among female population, the top three causes were neoplasms (33%), followed by external causes (22%) and diseases of the circulatory system (10%).

The fact that male physicians die almost three times more from diseases of the circulatory system when compared to medical deaths may be related to the fact that men present more risk factors for this group of diseases and present rates that are substantially higher than in women (BRANT et al., 2017; EYKEN; MORAES, 2009). However, it is interesting to note that neoplasms were the main causes of death among women. This result differs from what is presented in the specialized scientific literature on cancer mortality by sex in the country, which shows that, despite the higher prevalence of cancer in women, there is a higher mortality in males (ALCÂNTARA GOMES et al., 2005; BARROS et al., 2011). Likewise, estimates from the National Cancer Institute (INCa) point to a greater number of new cases in men than in women in the state of Bahia. Our finding, therefore, suggests the need for further and more profound investigations about the outstanding relative rate of mortality due to neoplasms in medical women in the state of Bahia.

Another point analyzed in the present study was the mortality coefficient. This coefficient fluctuated in the medical class during the period evaluated, varying from 1.66 in 2009 and 4.20 in 2015, unlike the general population that oscillated less (4.93 in 2008 and 5.87 in 2017). When

comparing this coefficient of mortality with that of the population of the state of Bahia, we can verify that the mortality coefficient of the population of Bahia is approximately twice as high (mean 5.51) than the mortality rate of the Bahian physician population (mean 2.66). Thus, as evidenced in previous studies, mortality in this class is expected to be lower in comparison with the general population and other professionals with the same characteristics (FRANK, 2004). In this analysis, however, it is important to highlight the significant increase in the number of medical professionals in recent years in Brazil. Between 2010 and 2017 there was a 23% increase in the number of these professionals reflecting the great expansion of medical schools in the country. This increase is largely superior to the growth of the general population and may contribute to the reduction of the medical mortality coefficient by greatly increasing the total number of doctors enrolled in CREMEB. In this sense, we reinforce the importance of conducting research on mortality and quality of life of physicians periodically, so that the effectiveness of prevention policies for this specific population can be compared and evaluated.

## 6 CONCLUSIONS

Considering the results obtained in this study, it is concluded that most of the deaths of doctors in the state of Bahia are male, white, married, in the age group of 60 to 69 years, in the capital. Among the main causes of death are diseases of the circulatory system, neoplasms and external causes, and in females the deaths due to neoplasms are highlighted. In addition, there was a higher number of female deaths in younger age groups, as opposed to males who focused on older age groups. Finally, the mortality coefficient of the medical class is approximately half of the population of Bahia during the period studied and may reflect the great expansion of the medical population in recent years.

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## ILLUSTRATIONS

Table 1 - Sociodemographic characteristics of the 489 deaths of physicians registered between 2008 and 2017 in Bahia, Brazil

| Gender | N (%) |
|---|---|
| Male | 412 (84.25%) |
| Female | 77 (15.75%) |
| **Year of death** | |
| 2008 | 34 (6.95%) |
| 2009 | 25 (5.11%) |
| 2010 | 45 (9.20%) |
| 2011 | 38 (7.77%) |
| 2012 | 32 (6.54%) |
| 2013 | 32 (6.54%) |
| 2014 | 51 (10.43%) |
| 2015 | 83 (16.97%) |
| 2016 | 66 (13.50%) |
| 2017 | 83 (16.97%) |
| **Marital status** | |
| Single | 50 (10.22%) |
| Married | 289 (59.10%) |
| Widower | 47 (9.61%) |
| Divorced | 48 (9.82%) |
| Others | 21 (4.29%) |
| Ignored | 34 (6.95%) |
| **Ethinicity** | |
| White | 327 (66.87%) |
| Black | 19 (3.89%) |
| Brown | 1 (0.20%) |
| Yellow | 127 (25.97%) |
| Ignored | 15 (3.07%) |
| **Region** | |
| Capital (Salvador) | 289 (59.10%) |
| Others | 200 (40.90%) |
| **Age Group** | |
| 20 - 29 | 9 (1.84%) |
| 30 - 39 | 20 (4.09%) |
| 40 - 49 | 21 (4.29%) |
| 50 - 59 | 53 (10.84%) |
| 60 - 69 | 140 (28.63%) |
| 70 - 79 | 107 (21.88%) |
| Above 80 | 139 (28.43%) |

Table 2 - Proportional mortality by cause of death of physicians in the period from 2008 to 2017 grouped by chapter of ICD-10 and sex. Data showing the proportion of deaths by systems / apparatuses and absolute number of cases, grouped by the total of the years

| Death causes (n, %) | Total | Male | Female | P-value |
|---|---|---|---|---|
| Circulatory System | 138 (28.22%) | 130 (31.55%) | 8 (10.39%) | 0.0002 |
| Neoplasm | 135 (27.61%) | 109 (26.46%) | 26 (33.77%) | |
| External Causes | 61 (12.47%) | 44 (10.68%) | 17 (22.08%) | |
| Respiratory System | 32 (6.54%) | 29 (7.04%) | 3 (3.9%) | |
| Digestive System | 27 (5.52%) | 23 (5.58%) | 4 (5.19%) | |
| Endocrine System | 25 (5.11%) | 20 (4.85%) | 5 (6.49%) | |
| Infectious Diseases | 16 (3.27%) | 15 (3.64%) | 1 (1.3%) | |
| Genitourinary System | 15 (3.07%) | 11 (2.67%) | 4 (5.19%) | |
| Nervous System | 15 (3.07%) | 10 (2.43%) | 5 (6.49%) | |
| Blood Diseases | 2 (0.41%) | 2 (0.49%) | 0 (0%) | |
| Menatl Diseases | 2 (0.41%) | 0 (0%) | 2 (2.6%) | |
| Skin Diseases | 1 (0.2%) | 1 (0.24%) | 0 (0%) | |
| Others | 17 (3.48%) | 16 (3.88%) | 1 (1.3%) | |

Table 3 - Coefficient of mortality of physicians and general population according to the year of death, considering the number of deaths in the period, number of enrolled in the CREMEB and number of the population of the state of Bahia according to SUVISA.

| Mortality rate (x1000) | Physicians (Total) | Population (Total) | Physicians (Male) | Population (Male) | Physicians (Female) | Population (Female) |
|---|---|---|---|---|---|---|
| 2008 | 2.41 | 4.93 | 4.02 | 5.82 | 0.33 | 4.05 |
| 2009 | 1.66 | 5.07 | 2.54 | 6 | 0.47 | 4.17 |
| 2010 | 2.82 | 5.49 | 3.94 | 6.57 | 1.32 | 4.45 |
| 2011 | 2.27 | 5.58 | 3.67 | 6.6 | 0.42 | 4.59 |
| 2012 | 1.83 | 5.7 | 2.62 | 6.76 | 0.79 | 4.67 |
| 2013 | 1.76 | 5.45 | 2.93 | 6.47 | 0.25 | 4.47 |
| 2014 | 2.69 | 5.57 | 4.05 | 6.66 | 0.96 | 4.52 |
| 2015 | 4.2 | 5.74 | 6.19 | 6.72 | 1.7 | 4.79 |
| 2016 | 3.19 | 5.77 | 4.21 | 6.9 | 1.93 | 4.68 |
| 2017 | 3.82 | 5.87 | 6.05 | 6.96 | 1.12 | 4.82 |