


## Analysis of the profile of pneumoconiosis hospitalizations from 2010 to 2020 in the Midwest Region of Brazil

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### ABSTRACT

**Introduction:** Pneumoconiosis is the term that encompasses heterogeneous occupational interstitial lung diseases caused by the inhalation of mineral dust into the lungs. Being globally recognized as a risk to public health, knowledge and its epidemiological and economic characterization facilitate the development of occupational health policy through the elaboration of health surveillance, promotion and protection actions according to its regional distribution. **Objective:** To describe and analyze the profile of hospitalizations related to occupational respiratory diseases, specifically Pneumoconiosis, from 2010 to 2020 in the Midwest region. **Methodology:** Retrospective, descriptive and exploratory research of data collected in a virtual platform of the Department of Information Technology of SUS (DATASUS) with a focus on epidemiological data and morbidity and mortality, with the main objective of describing and analyzing these data related to occupational respiratory diseases and, specifically, Pneumoconiosis. Among the 50 selected articles, 15 were submitted to a careful analysis focusing on the objective proposed by the study.

**Results:** When analyzing the rate of hospitalizations due to pneumoconiosis between 2009 and 2020, it was observed that 2012 was the year with the highest number of cases, followed by 2014, and, in the total of this period, 825 cases were observed in the Midwest (OC) region. The OC state with the highest number of cases was Goiás, representing about 45% of the cases, followed by the state of Mato Grosso, with approximately 39%. In addition, a predilection of males was observed, representing 60% of the cases. **Conclusion:** The data presented in this study establish a vast database for investigation and deeper knowledge about the occurrence of pneumoconiosis in the central region of Brazil, evidencing the importance of carrying out follow-up studies and developing public health policies related to occupational respiratory diseases.

**Keywords:** Pneumocystosis, Hospitalization, Occupational, Epidemiology, Profile.

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## INTRODUCTION

The respiratory system performs an important interface between the body and the environment, so air pollution in the workplace is related to a wide range of respiratory tract diseases that reflect on the quality of life of workers<sup>1,2</sup>. Despite the lung diseases etiologically related to the inhalation of dust and organic or non-organic fibers in the air in the workplace, the term pneumoconiosis is designated for this occupational disease<sup>3,4,5</sup>.

Pneumoconiosis can be didactically classified as fibrogenic and non-fibrogenic, depending on the potential of dust to cause the process of reactional fibrosis<sup>1,3,4</sup>. In general, all parenchymal lung diseases caused by dust inhalation are included, without taking into account the pathophysiological process involved. Thus, it suppresses neoplastic causes, airway reactions such as asthma, bronchitis, and emphysema from this designation<sup>2,3</sup>. The main and most frequent representatives of pneumoconiosis found are: asbestosis, silicosis, and coal miner's lung, highlighting the pathophysiological process of interstitial fibrosis with its consequent reduction in parenchymal expansion, associated with barriers to gas exchange<sup>3,4,5</sup>.

Being the result of the inhalation of dust and particles such as silica, asbestos fibers, beryllium, talc and coal dust, the patient's personal history reflects the long-term exposure to these harmful inhalants, which usually occurs in the workplace<sup>5,6,7</sup>. The occupations with the highest risk exposure to inhalations harmful to workers are related to the sphere of practices related to mining and transformation of minerals, metallurgy, ceramics, glass, civil construction, agriculture, wood industry, among others<sup>3,8</sup>. Screening for pneumoconiosis is performed by associating clinical and occupational history of exposure to noxious dust and imaging exams, usually chest X-rays, according to the standards established by the International Labor Organization (ILO)<sup>3,5,6,8,10</sup>.

Pneumoconiosis is globally recognized as a public health risk. Its high incidence and mortality lie in the lack of occupational protection and the lack of early diagnostic methods and suitable therapy<sup>2,6</sup>. In Brazil, although technological advances have led to a decrease in the exposure of workers to certain occupational hazards, making the environment less dangerous and unhealthy, there is the emergence of other risks related to the development and implementation of nuclear, genetic and microscopic processes, which entail new risks to the environment and public health in the country<sup>1, 5</sup>.

In view of this fact, it is important to highlight the importance of the Occupational Health branch in the Public Health sector, regulated in paragraph 3, article 6 of the Organic Health Law No. 8,080/90, which assigned to the national management of the SUS the responsibility of coordinating the occupational health policy through epidemiological and sanitary surveillance actions, the promotion and protection of workers' health, as well as the recovery and rehabilitation of those subjected to risks and injuries arising from working conditions<sup>1,9</sup>.



In order to support the prevention and control of occupational lung diseases, activities related to industrial hygiene, educational actions and medical control actions of the exposed working population are implemented, since the prevention and management of this pathology provides a reduction in public health expenditures in relation to respiratory morbidity and the economic and social loss of labor of the working population exposed to occupational risks<sup>3,5,6</sup>.

Epidemiological data on pneumoconiosis in Brazil and, especially, in the Midwest region of the country are scarce and are limited to a few branches of activity in focal situations. Thus, the main objective of the study is to describe and analyze the profile of hospitalizations related to occupational respiratory diseases, specifically Pneumoconiosis, in the period from 2010 to 2020 in the Midwest region.

## **METHODOLOGY**

This is a retrospective, descriptive and exploratory research, whose data were obtained from the virtual platform of the Department of Information Technology at the Service of SUS (DATASUS), with access to the Health Information System and focus on data related to the SUS Epidemiology and Morbidity system (SIH/SUS). For the elaboration of the study, a selection of general data on gender, age, place and value of hospitalization was carried out, from the year 2009 to 2020, being developed in September 2021 through the analysis of pre-existing studies, focusing on the synthesis of data focused on the main theme.

With the main objective of describing and analyzing epidemiological data related to occupational respiratory diseases, specifically Pneumoconiosis, information was collected on the number of hospitalizations according to the year of processing, according to sex and age group, number of deaths according to year of processing, as well as their mortality rate according to sex, in addition to comparing the values of hospital services by type of care. regimen and International Classification of Diseases (ICD-10) for pneumoconiosis. Data were collected from September 2021 to November 2021 and obtained from secondary data in the public domain available in the DATASUS databases. In view of the accessibility of the data and the guarantee of non-identification of the participating individuals, the present study did not require submission and approval by the Research Ethics Committee (REC).

The tabulation of the information obtained by the DATASUS form was carried out using Microsoft Office Excel 2021®, where the data were separated by quantitative statistical variables (relative frequency and percentage) with the elaboration of tables and graphs, followed by the interpretation of the data and its critical correlation with the existing literature. Aiming at the scientific critical basis, a search was carried out in the PubMed/MEDLINE, SciELO and VHL databases, in September 2021, in which the following were used: DeCS/VHL: "Pneumoconiosis",



"Occupational Exposure", "Prevention" and "Hospitalization" with combinations associated with the Boolean operator AND, in English. Initially, articles were included for analysis following the identification of the theme, followed by the exclusion of those not available in full, duplicates or that did not fit the proposed objective, not restricting filters to search for publications. From a total of 50 articles published between 2001 and 2021, 15 articles were selected, which are original articles, systematic reviews, and protocols in English and Portuguese, with a focus on the proposed objective.

## DEVELOPMENT

Pneumoconiosis is characterized as an occupational disease, i.e., related to the patient's professional activity and all the issues that involve it <sup>5</sup>. The occupations that can lead to pneumoconiosis are related to several branches of activities, especially those related to fine dust, such as mining, and the transformation of minerals, including civil construction <sup>3</sup>.

This pathology is related to irreversible damage to the lung parenchyma, so that its prevention can only occur through measures to contain exposure to the harmful agent <sup>3</sup>. Due to this chronic nature, it is an important health problem not only in Brazil but also globally, and can reach an incidence rate of approximately 100% of cases of exposure <sup>11</sup>.

In the present study, a survey of the main variables regarding hospitalizations due to pneumoconiosis was carried out, including the most affected periods and regions of the state, gender, age, and the average hospitalization costs spent, in order to identify the pattern of disease involvement in the Midwest (OC) region of Brazil.

List of Morb ICD 10	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Diseases of the apparatus Respiratory - pneumoconioses	6	81	61	126	65	107	99	60	53	58	63	46	825

Hospitalizations per year in the Midwest region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System

Among the years analyzed regarding the hospitalization rate in the CO region, 2012 was the year with the highest number of cases, followed by 2014. In addition, in the period from 2009 to 2020, there were 825 cases observed in all regions of the OC.

It is important to emphasize that pneumoconiosis is a disease with a long latency period, i.e., its carriers have a long asymptomatic period of approximately 10 years <sup>12</sup>. Therefore, the data regarding the number of hospitalizations reproduce those that are in a more advanced phase of the



pathology and, consequently, more distant from its causal period, in which exposure to the aggressive particles occurred.<sup>13</sup>

In addition, hospitalizations due to pneumoconiosis indicate episodes of exacerbations of the disease in its carriers, greater worsening of the disease and, consequently, worsening of quality of life<sup>14</sup>. It is worth noting that not all patients with this comorbidity go through periods of exacerbations, indicating that the number of patients is much higher than the number presented in the databases in relation to their hospitalizations<sup>14</sup>. It is also important to note that pneumoconiosis may be related to other diseases, including tuberculosis, with a higher risk of infection, but with a low severity threshold of disease, carcinomas, and overlapping COPD or emphysema<sup>15,1,16,17</sup>. In addition, the data analyzed, especially those from 2020, overlap with the period of the COVID-19 pandemic, and, due to the identification of the correlation of this pathology with pneumoconiosis, it may, therefore, be a cause for the increase in this hospitalization rate, not only this year, but also in future data.<sup>18th</sup>

In addition, other factors may generate a bias in relation to the data presented, such as misdiagnosis and low demand for medical care. Because it is a causal disease to an exposure, a very detailed anamnesis is essential for its diagnosis, corroborating diagnostic failures. In addition, many workers fail to seek medical care or refuse it for fear of losing their jobs.<sup>14,6</sup>

List of Morb ICD 10	MS	MT	GO	DF	Total
Diseases of the apparatus Respiratory - pneumoconioses	59	322	378	66	825

Hospitalizations by Federation Unit in the Midwest region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System

When we relate hospitalization rates with the OC states, we have a higher incidence of cases in the region of Goiás (n= 378), a region of high development, as well as in Mato Grosso (n= 322), the region with the largest extension of OC. When comparing these numbers with the other regions, namely Mato Grosso do Sul and the Federal District, that present, respectively, n = 59 and n = 66, it is possible to observe a strenuous difference between the number of cases in each locality.

List of Morb ICD 10	Mask	Five	Total
Diseases of the apparatus Respiratory - pneumoconioses	500	325	825

Hospitalizations by sex in the Midwest region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System



List of Morb ICD 10 Region/Federation Unit	Mask	Five	Total
Midwest Region	500	325	825
Mato Grosso do Sul	36	23	59
Mato Grosso	182	140	322
Goiás	234	144	378
Federal District	48	18	66

Hospitalizations by Sex according to Region/Federation Unit of the Midwest Region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System

When analyzing the incidence by sex, higher numbers were observed among males (N= 500) when compared to females (n= 325). The distribution among the states was mainly concentrated in the regions of Goiás (n= 234 for males and N=144 for females) and Mato Grosso (n= 182 for males and 140 for females)

According to Silva et. al. (2018), males have a higher prevalence when compared to females, as well as the one also described by other authors, in which the percentages vary between 60-70% of cases. This higher number is mainly due to the greater exposure of this portion to studies that pose a risk for the development of pneumoconiosis.<sup>19,20,21</sup>

Region/Federation Unit	15 to 19 years old	20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	60 to 69 years old	70 to 79 years old	80 years and over	total
Total	13	43	61	99	114	125	106	73	825
Midwest Region	13	43	61	99	114	125	106	73	825
Mato Grosso do Sul	-	4	9	7	8	13	5	9	59
Mato Grosso	5	13	19	26	38	39	33	20	322
Goiás	6	19	23	56	61	61	58	37	378
Federal District	2	7	10	10	7	12	10	7	66

Hospitalizations by Age Group according to Region/Federation Unit of the Midwest region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System

Regarding the number of hospitalizations by age group, it is possible to analyze a trend towards an increase in hospitalizations as age increases. When looking at the age group of the



economically active population (15 to 65 years), cases in this range correspond to approximately 55% (n=455) of the total number of hospitalizations in the OC (=825), which justifies pneumoconiosis as a work-related disease. It is worth noting that among these numbers, most cases correspond to the age group of 60 to 69 years (n=125), evidencing the chronic aspect, of slow and progressive onset of the disease <sup>1,2,3,22</sup>. Hospitalizations in young adults (15-45 years) suggest an acute or accelerated presentation of the disease <sup>22</sup>.

List of Morb ICD 10 Region/Federation Unit	Mean hospitalization rate
Midwest Region	873,74
Mato Grosso do Sul	1.322,06
Mato Grosso	599,44
Goiás	1.007,37
Federal District	1.040,93

Mean hospitalization rate according to Region/Federation Unit of the Midwest region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System

List of Morb ICD 10	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Average value of hospitalizations	393,10	459,43	881,34	609,72	496,57	811,14	689,17	1.250,34	1.298,99	1.310,67	1.338,29	1.279,43	873,34

Average hospitalization rate according to year of care in the Midwest region. ICD Morb List 10: pneumoconiosis. Period 2010-2020. Source: Ministry of Health - SUS Hospital Information System

Between 2010 and 2020, there was an increase in the average value of hospitalizations in the Midwest region, which is justified by the increasing adjustment of inflation. This average value when analyzed by each Federation Unit, Mato Grosso do Sul is the state that has the highest expenditure (R\$ 1,322.06), and this amount is more than double that spent by Mato Grosso (R\$ 599.44). The states with the highest number of hospitalizations, which are Mato Grosso, followed by Goiás, are the ones with the lowest hospitalization expenses.

In addition to the significant rates of hospitalizations, the losses in the economic sector are greater when the prolonged use of medications and the need to leave workers from their respective functions are added, in order to contain the exposure to harmful substances <sup>23</sup>

The best way to contain the incidence and prevalence of pneumoconiosis is through exposure prophylaxis measures. Therefore, protection measures at the individual and collective level are



essential in this process. It is important to carry out health education activities to make workers aware of the need to use PPE, and it is essential to carry out training to ensure the correct use of PPE.<sup>23,24</sup>





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