Prevalence of temporary social security benefits due to respiratory disease in Brazil*

Prevalência de benefícios de seguridade social temporários devido a doença respiratória no Brasil

Simone de Andrade Goulart Ildefonso,
Anadergh Barbosa-Branco, Paulo Rogério Albuquerque-Oliveira

Abstract

Objective: To determine the prevalence of temporary social security benefits due to respiratory disease granted to employees, as well as the number of lost workdays and costs resulting from those in Brazil between 2003 and 2004. **Methods:** Cross-sectional study using data obtained from the Unified System of Benefits of the Brazilian Institute of Social Security (INSS, *Instituto Nacional de Seguro Social*) and the Brazilian Social Registry Database. Data regarding gender, age, diagnosis and type of economic activity, as well as type, duration and cost of benefits, were compiled. **Results:** Respiratory diseases accounted for 1.3% of the total number of temporary social security benefits granted by INSS, with a prevalence rate of 9.92 (per 10,000 employment contracts). Females and individuals older than 50 years of age were the most affected. Non-work-related benefits were more common than were work-related benefits. The most prevalent diseases were pneumonia, asthma and COPD, followed by laryngeal and vocal cord diseases. The most prevalent types of economic activity were auxiliary transportation equipment manufacturing, tobacco product manufacturing and computer-related activities. The mean duration of benefits was 209.68 days, with a mean cost of R$ 4,495.30 per occurrence. Respiratory diseases caused by exogenous agents demanded longer sick leave (mean, 296.72 days) and greater cost (mean, R$ 7,105.74). **Conclusions:** The most prevalent diseases were airway diseases and pneumonia. Workers from auxiliary transportation equipment manufacturing, tobacco product manufacturing and computer-related activities were the most affected. Diseases caused by exogenous agents demanded longer sick leaves and resulted in greater costs.

Keywords: Respiratory tract diseases; Sick leave; Work; Workers' compensation; Social security.

Resumo

Objetivo: Determinar a prevalência dos benefícios temporários do tipo auxílio-doença, devido a doença respiratória, concedidos aos trabalhadores empregados, bem como os dias de trabalho perdidos e custos decorrentes destes no Brasil entre 2003 e 2004. **Métodos:** Estudo transversal com dados obtidos do Sistema Único de Benefícios do Instituto Nacional de Seguro Social (INSS) e do Cadastro Nacional de Informações Sociais. Foram compilados dados sobre o sexo, idade, diagnóstico, ramo de atividade econômica, espécie, duração e custo dos benefícios. **Resultados:** As doenças respiratórias representaram 1,3% do total de benefícios auxílio-doença concedidos pelo INSS, com um coeficiente de prevalência de 9,92 (por 10.000 vínculos). As mulheres e as faixas etárias acima de 50 anos foram mais acometidas. Os benefícios previdenciários foram mais frequentes que aos acidentários. As doenças mais prevalentes foram pneumonia, asma, DPOC e doenças das cordas vocais e da laringe. Os ramos de atividade econômica mais prevalentes foram fabricação de outros equipamentos de transporte, fabricação de produtos do fumo e atividades de informática e conexas. A média da duração dos benefícios foi de 209,68 dias, com custo médio de R$ 4.495,30 por benefício. As doenças respiratórias por agentes exógenos demandaram maiores tempo de afastamento (média, 296,72 dias) e custo (média, R$ 7.105,74). **Conclusões:** As doenças mais prevalentes foram as das vias aéreas e as pneumonias. Os trabalhadores da fabricação de outros equipamentos de transporte, indústria do fumo e da atividade de informática foram os mais incapacitados. As doenças por agentes exógenos demandaram maior custo e duração.

Descritores: Doenças respiratórias; Licença médica; Trabalho, Indenização aos trabalhadores; Previdência social.

---

* Study carried out in the Collective Health Department, University of Brasília, Brasília, Brazil.
Correspondence to: Simone de Andrade Goulart Ildefonso. SQN 102, Bloco F, apto. 504, CEP 70722-060, Brasília, DF, Brasil.
Tel 55 61 3313-9273. E-mail: sagibsb@yahoo.com.br
Financial support: None.
Submitted: 15 February 2008. Accepted, after review: 12 June 2008.

Introduction

Worldwide, labor has a strong impact on health, from a social as well as an economic viewpoint. Exposure to occupational risk factors accounts for a significant proportion of all diseases and lesions. In 2000, occupational risks were associated with approximately 850,000 deaths and resulted in the loss of 24 million potential years of healthy life.[1]

In this context, respiratory diseases (RDs) are one of the principal causes of incapacity for work, as well as of a high number of lost workdays due to sick leave.[2-4] It is estimated that, worldwide, occupational risk factors account for 13% of COPD cases, 11% of asthma cases and 9% of lung cancer cases.[1]

The relationship between RDs and labor is explained by the direct contact between the respiratory system and the environment. The environment in workplaces can be the source of exposure to various inhaled agents, among which are gases, toxic smoke, organic dust and inorganic dust, all of which can produce a wide range of respiratory tract diseases, from the nasal passages to the pleural space.[5]

Another fact to be considered is that RDs are highly prevalent in the general population. Acute RDs are the most common conditions of humanity and the principal cause of absenteeism at school and at work. Chronic RDs are surpassed only by cardiovascular diseases as a cause of retirement due to permanent disability. Lung cancer kills more people each year than does any other type of neoplasia.[6]

In Brazil, the available data on incapacity due to RDs are inconsistent. The number of workers exposed to inhaled risk, the agents involved and the level of exposure are unknown. Similarly, the number of people who developed a disease or died due to such exposure is unknown, as are the costs that result from these insults.[7]

Many professionals in the health care area ignore the environmental or occupational etiology of RDs, which results in underreporting of cases, as well as in a lack of characterization of the causal relationship between labor and the diagnosis of the worker.[7] The recognition of the relationship between RDs and the occupation of the sick worker is important in order to enable the implementation of strategies to prevent exposure, improve prognosis, obtain compensation for the affected worker and lead to alterations in the work environment that have a favorable impact on the health of other workers at risk.[8]

In view of the situation presented, the objective of the present study was to determine the prevalence of temporary social security benefits due to DRs in employees in Brazil between 2003 and 2004, attempting to identify the potential relationship between the branches of economic activity and this group of diseases, as well as the resulting costs and lost workdays.

Methods

This was a cross-sectional study in which we analyzed temporary social security benefits granted by the *Instituto Nacional de Seguro Social* (INSS, Brazilian Institute of Social Security) to workers with a formal labor contract due to RDs between 2003 and 2004. The data were obtained from the payment registry system of INSS benefits, *Sistema Único de Benefícios* (SUB, Unified System of Benefits), processed by the Social Security Technology and Information Company. Each social security occurrence involving a benefit granted is recorded at the SUB, where it is given a single identification number, and these records include data for the company and the employee, including the clinical diagnosis, codified by the tenth revision of the International Classification of Diseases (ICD-10),[9] and the branch of activity, codified by the National Classification of Economic Activities (NCEA), version 1.0.[10] The benefits that correspond to the period studied refer to those entered in the SUB during the period, and the sick leave might have started at a date before it was entered. For the benefits not terminated by April 30th of 2005, when the data were extracted, this date was defined as the termination date of the benefit, and its duration should be understood as the minimum duration. Demographic data were obtained from the Brazilian Social Registry Database, monthly updated by the companies using the payment form of the Severance Pay Indemnity Fund, reported to the INSS, and they refer to the annual average amount of deposits made during the period. When employees have any incapacitating health problem and cannot work for more than 15 days, they are eligible for temporary social security benefits, which can be non-work-related or work-related benefits. The formal characterization of incapacity for work (and, consequently, receiving temporary social security benefits) as well as the suspension of the benefit (discharge) are carried out by an

Table 1 - Distribution of benefits (prevalence per 10,000 employment contracts) due to respiratory diseases by gender, type and principal branches of activity, Brazil, 2003-2004.

NCEA	Gender									Total				
	Male				Female									
	B31	B91	B31+B91	B31/B91 Ratio	NCEA	B31	B91	B31+B91	B31/B91 Ratio	NCEA	B31	B91	B31+B91	B31/B91 Ratio
35	35.62	1.14	36.76	31.17	16	48.81	0.00	48.81	-	35	32.93	1.02	33.95	32.17
16	19.54	0.00	19.54	-	72	28.93	8.70	37.63	3.33	16	31.35	0.00	31.35	-
20	18.64	0.67	19.30	27.85	62	20.62	1.59	22.21	13.00	72	16.03	4.22	20.25	3.80
36	17.71	0.74	18.45	23.80	90	20.82	0.58	21.40	36.00	90	18.25	0.30	18.55	61.00
90	17.91	0.24	18.15	73.50	36	19.40	0.31	19.71	62.00	36	17.78	0.63	18.40	28.29
26	16.88	0.90	17.78	18.76	37	19.23	0.00	19.23	-	20	17.64	0.56	18.20	31.54
45	14.26	0.29	14.55	48.61	17	17.88	0.38	18.26	47.00	26	16.17	0.79	16.96	20.52
28	12.99	0.63	13.63	20.47	74	14.29	0.41	14.69	35.17	17	14.63	0.36	14.99	41.10
17	12.97	0.35	13.31	37.17	18	14.46	0.21	14.67	67.57	45	13.79	0.27	14.06	51.16
23	12.11	0.57	12.67	21.40	75	14.24	0.39	14.63	36.98	28	12.41	0.54	12.96	22.82
27	11.75	0.79	12.54	14.86	15	14.31	0.24	14.55	60.83	18	12.74	0.18	12.92	70.63
61	12.51	0.00	12.51	-	20	14.41	0.00	14.41	-	75	12.20	0.26	12.46	47.33
71	11.66	0.74	12.40	15.75	64	13.09	0.88	13.97	14.83	23	11.87	0.51	12.38	23.20
29	11.56	0.38	11.93	30.70	19	12.26	0.12	12.38	103.50	27	11.30	0.73	12.03	15.50
31	11.09	0.23	11.32	49.00	26	12.36	0.00	12.36	-	15	11.64	0.22	11.86	52.17
60	11.08	0.20	11.28	56.76	25	11.58	0.29	11.87	40.00	61	11.56	0.00	11.56	-
41	10.70	0.52	11.22	20.50	60	11.45	0.31	11.76	37.33	29	11.12	0.33	11.45	34.00
15	10.98	0.22	11.20	49.12	22	11.13	0.17	11.30	66.00	19	11.23	0.19	11.42	58.86
19	10.82	0.26	11.08	41.00	80	10.37	0.61	10.98	17.03	60	11.03	0.20	11.24	53.85
63	9.94	0.06	10.00	163.00	63	9.82	1.13	10.95	8.67	74	10.86	0.30	11.16	35.69
Total	9.32	0.24	9.56	38.81	Total	10.56	0.36	10.92	29.24	Total	9.64	0.28	9.92	34.34

NCEA: National Classification of Economic Activities; B31: non-work-related temporary social security benefits; B91: work-related temporary social security benefits; 35: auxiliary transportation equipment manufacturing; 16: tobacco product manufacturing; 20: woodworking industries; 36: furniture manufacturing and diverse industries; 90: urban sanitation and sewage; 26: nonmetallic mineral product manufacturing; 45: construction; 28: metal products manufacturing; 17: textile products manufacturing; 23: coke production, oil refining, processing of nuclear fuel and alcohol production; 27: basic metallurgy; 61: waterborne transportation; 71: rental of vehicles, unmanned machinery and equipment, personal objects and household appliances; 29: machinery and equipment manufacturing; 31: machinery, equipment and electrical material manufacturing; 60: land transportation; 41: water capture, treatment and distribution; 15: food and beverage manufacturing; 19: tanning and leatherwork, travel gear and shoes; 63: transportation and travel agency related activities; 72: computer-related activities; 62: air transportation; 37: recycling; 74: services rendered mainly to companies; 18: clothing and accessories manufacturing; 75: public administration, defense and social security; 64: post office and telecommunications; 25: manufacturing of rubber and plastic objects; 22: sound editing, recording and production; and 80: education.

expert of the INSS team of physicians or accredited by this organ.

The data analysis was structured based on morbidity and on branch of activity, and the former was characterized by the ICD-10 division into chapters (large groups of diseases) and by three-digit specific disease code, and the second was characterized by NCEA with a two-digit code.

The prevalences of benefits were determined by branch of activity, gender, age bracket, type, groups of DRs and specific diseases, as well as by the duration and cost of benefits. Prevalence was calculated as the sum of the benefits granted during the period divided by the mean number of employment contracts held between 2003 and 2004, multiplied by 10,000. Duration and cost were calculated by the mean duration (lost workdays) and the cost (value of the benefit divided by thirty and multiplied by its duration) of the benefits granted in the period. Since these are census data, no statistical tests were performed.

The identity of the workers and companies was not entered in the databases to which the researchers had access and, since these are administrative data, the protocol was not submitted to the Ethics in Research Committee.

Results

Between 2003 and 2004, 1,925,329 benefits were approved by the INSS and granted to employees covered by the social security service in Brazil, considering all diseases, of which 24,597 were due to RDs (1.3%). In this period, mean employment contracts was 24,791,826, with a DR prevalence rate of 9.92 benefits per 10,000 employment contracts.

The analysis of the benefits by gender revealed that females requested 14% more benefits due to RDs than did males (Table 1).

Age directly correlated with RDs, since individuals older than 50 years of age were the most affected (57.40), whereas the individuals under 30 years of age presented the lowest prevalence (0.58; Table 2).

The study of the benefits by type—non-work-related temporary social security benefits or work-related temporary social security benefits—revealed a high predominance of the former, with a prevalence ratio among types of 34.34:1.00. Regarding this indicator, the characterization of a relationship with labor was greater among females than among males, with non-work-related/work-related benefit ratios of 29.24:1.00 and 38.81:1.00, respectively (Table 1).

When sick leaves were analyzed by RD groups, we observed that the highest prevalences were found in the following groups: "chronic diseases of lower airways" (4.01), "influenza and pneumonia" (2.13) and "other diseases of the upper airways" (1.66; Table 2).

The most prevalent diseases were the following: pneumonia (1.77); asthma (1.69); unspecified COPD (1.12); laryngeal and vocal cord diseases not elsewhere classified (0.86); and emphysema (0.44). When this variable was analyzed by the gender of the recipient of the benefit, we observed that, among males, the principal causes followed the same order of overall prevalence. However, among females, this profile was differentiated, with predominance of asthma (2.34), laryngeal and vocal cord diseases (2.11), pneumonia (1.35), unspecified COPD (0.81) and chronic laryngitis and laryngotracheitis (0.37), showing that the male gender determined the general profile (Table 3).

As shown in Table 4, when the prevalences of benefits due to RDs were considered by branch of economic activity according to NCEA, the most affected groups were the following: "auxiliary transportation equipment manufacturing" (34.64); "tobacco product manufacturing" (31.89); "computer-related activities" (20.25); "urban sanitation and sewage" (18.75); "furniture manufacturing and diverse industries" (18.52); "woodworking industries" (18.37); and "nonmetallic mineral product manufacturing" (17.07). Knowing that the overall RD prevalence rate was 9.92, it was possible to calculate the influence of the branch of economic activity on sick leaves due to RDs. Therefore, the probability that a worker from the "auxiliary transportation equipment manufacturing" group would develop an RD was 3.5 times greater than that of all the workers in Brazil put together; whereas in the "tobacco product manufacturing" and "computer-related activities" groups this probability was 3.2 and 2.0 times greater, respectively. The latter branch presented greater characterization of work-related benefit (prevalence ratio of 3.8:1.0), especially due to the contribution of the female gender, which presented a 3.3:1.0 ratio (Table 1), whereas the males presented a 11.4:1.0 ratio.

Considering the variables branch of economic activity and gender in relation to RD prevalence, discrepancies between genders can be noticed. In

Table 2 - Distribution of benefits (prevalence per 10,000 employment contracts) due to respiratory disease by age bracket and respiratory disease group (Chapter X of the tenth revision of the International Classification of Diseases), Brazil, 2003-2004.

Groups	Age bracket. years					
	< 30	30.0-39.9	40.0-49.9	50.0-59.9	> 60	Total
J00-J06	0.05	0.43	0.46	0.39	0.36	0.45
J10-J18	0.14	2.06	3.04	3.97	4.49	2.12
J20-J22	0.01	0.19	0.31	0.54	0.53	0.22
J30-J39	0.15	1.88	1.88	1.42	0.55	1.66
J40-J47	0.13	2.70	6.02	15.21	24.18	4.01
J60-J70	0.01	0.30	0.49	0.77	0.53	0.30
J80-J84	0.01	0.14	0.28	0.39	0.50	0.16
J85-J86	0.01	0.14	0.17	0.30	0.14	0.13
J90-J94	0.05	0.53	0.70	0.74	0.50	0.55
J95-J99	0.01	0.29	0.49	0.77	1.11	0.32
Total	0.58	8.65	13.85	24.50	32.90	9.92

J00-J06: acute infections of the upper airways; J10-J18: influenza and pneumonia; J20-22: other acute infections of the lower airways; J30-J39: other diseases of the upper airways; J40-J47: chronic diseases of the lower airways; J60-J70: lung diseases due to external agents; J80-J84: other respiratory diseases which mainly affect the interstitium; J85-J86: necrotic and suppurative diseases of the lower airways; J90-J94: other pleural diseases; J95-J99: other diseases of the respiratory system.

Table 3 - Distribution of benefits due to respiratory disease (prevalence per 10,000 employment contracts) by gender, type and principal specific causes of diseases of the respiratory system according to the tenth revision of the International Classification of Diseases, Brazil, 2003-2004.

ICD-10	Gender						Total		
	Male			Female					
	B31	B91	Total	B31	B91	Total	B31	B91	Total
J45	1.31	0.04	1.35	2.32	0.03	2.34	1.66	0.04	1.69
J18	1.39	0.01	1.39	0.90	0.00	0.90	1.19	0.00	1.19
J44	1.31	0.01	1.32	0.81	0.00	0.81	1.11	0.00	1.12
J38	0.15	0.01	0.15	1.90	0.21	2.11	0.78	0.08	0.86
J15	0.67	0.00	0.67	0.45	0.00	0.45	0.58	0.00	0.58
J43	0.58	0.00	0.58	0.23	0.00	0.23	0.44	0.00	0.44
J93	0.32	0.02	0.33	0.11	0.00	0.12	0.24	0.01	0.25
J90	0.28	0.00	0.28	0.17	0.00	0.17	0.23	0.00	0.23
J42	0.24	0.01	0.25	0.21	0.00	0.21	0.23	0.00	0.23
J98	0.24	0.00	0.25	0.16	0.00	0.17	0.21	0.00	0.22
J01	0.19	0.00	0.20	0.21	0.00	0.22	0.20	0.00	0.20
J34	0.18	0.01	0.18	0.17	0.00	0.17	0.17	0.00	0.18
J40	0.16	0.00	0.16	0.18	0.00	0.18	0.17	0.00	0.17
J37	0.03	0.00	0.03	0.35	0.03	0.37	0.14	0.01	0.16
J47	0.15	0.00	0.15	0.15	0.00	0.15	0.15	0.00	0.15
J32	0.12	0.00	0.13	0.18	0.00	0.18	0.14	0.00	0.15
Others	1.99	0.13	2.13	2.07	0.07	2.14	2.00	0.11	2.10
Total	9.32	0.24	9.56	10.56	0.36	10.92	9.64	0.28	9.92

ICD-10: International Classification of Diseases, version 10; B31: non-work-related temporary social security benefits; B91: work-related temporary social security benefits; J45: bronchial asthma; J18: unspecified pneumonia; J44: other chronic obstructive pulmonary diseases; J38: other laryngeal and vocal cord diseases; J15: bacterial pneumonia; J43: emphysema; J93: pneumothorax; J90: not classified pleural effusion; J42: unspecified chronic bronchitis; J98: other respiratory disorders; J01: acute sinusitis; J34: other disorders of the nose and paranasal sinuses; J40: bronchitis not specified as acute or chronic; J37: chronic laryngitis and laryngotracheitis; J47: bronchiectasis; J32: chronic sinusitis.

the male gender, the most involved branches were "auxiliary transportation equipment manufacturing" (37.42), "tobacco product manufacturing" (19.54), "woodworking industries" (19.41), "furniture manufacturing and diverse industries" (18.60), "urban sanitation and sewage" (18.27) and "nonmetallic mineral product manufacturing" (17.86). In the female gender, "tobacco product manufacturing" outweighed the others (Table 4), with a prevalence rate of 50.10, followed by "computer-related activities" (37.63), "air transportation" (22.21), "urban sanitation and sewage" (21.98), "furniture manufacturing and diverse industries" (19.71) and "recycling" (19.23).

The assessment of benefits due to specific diseases and branches of economic activity shows that pneumonias predominated in the groups "auxiliary transportation equipment manufacturing" (13.48), "urban sanitation and sewage" (5.69) and "tobacco product manufacturing" (4.26). Asthma was more prevalent among workers of the groups "tobacco product manufacturing" (7.44), "furniture manufacturing and diverse industries" (6.54), "clothing and accessories manufacturing" (4.85) and "textile products manufacturing" (4.34). A diagnosis of COPD was associated with "tobacco product manufacturing" (6.91), "woodworking industries" (4.00), "urban sanitation and sewage" (2.69), "nonmetallic mineral product manufacturing" (2.63) and "construction" (2.18). As also shown in Table 4, laryngeal and vocal cord diseases were present in the groups "computer-related activities" (12.06), "financial intermediaries" (4.63), "public administration, defense and social security" (3.22) and "education" (3.18).

The total duration of sick leaves, considering they were of minimum duration, was 5,157,537 lost workdays, at a total cost of R$ 110,570,836.97. The mean minimum duration of benefits was 209.68 ± 218.54 days, with a mean cost of R$ 4,495.30 ± 6,123.03 per occurrence. The RDs caused by exogenous agents, although with a low prevalence (0.30), demanded longer sick leave (296.72 ± 235.43 days) and greater cost (R$ 7,105.74 ± 7,784.45), followed by the group of interstitial diseases and the group of chronic obstructive diseases (Table 5).

Discussion

The analysis of the data in question should be understood within a specific context and should be interpreted with caution. It must be borne in mind that the results presented refer to temporary social security benefits granted to formal workers. Therefore, these results should not be extrapolated to the general population. First and foremost, we must consider the age bracket of the study population, adults between 16 and 65 years of age. In addition, studies involving populations of workers are vulnerable to the "healthy worker effect", in which there is a selection of susceptible individuals outside the workforce. This fact could underestimate the exposure effects. In addition, the working population usually presents high levels of exposure and therefore provides a poor estimate of the impact of the disease on the general population.[11]

The data also represent the insults with moderate to severe clinical repercussion, that is, those that resulted in incapacity for work of more than 15 days.[12,13] In addition to the severity of the insult, the administrative operationalization capacity of the social security institution and even legal issues for the recognition of the technical relationship can also impact the duration of the benefits.

Finally, the number of benefits granted might not have represented the number of employees covered by social security with a temporary incapacitating insult during that period, since temporary social security benefits can be granted more than once to the same employee over a year.[13]

Having dispensed with these considerations, we will analyze the most prevalent RDs, relating them to the risk factors present in the branches of activity in which they prevailed.

The group of RDs characterize the leading cause of absenteeism at work.[6] However, when we consider the social security context, which only involves sick leaves of more than fifteen days, the participation of RDs is almost irrelevant in the set of cases of incapacity and temporary social security benefits. Since most common RDs present self-limiting acute infection, most of them did not result in occurrences of benefits.

The high prevalence of pneumonia found in this study was expected, since pneumonia is a common disease in Brazil and the second cause of hospitalization in the country, with 783,480 cases in 2003. It is estimated that the annual incidence of this disease in Brazil is 2,100,000 cases.[14]

Infectious pneumonias, in contrast to those caused by hypersensitivity and toxic pneumonias,

Table 4 - Distribution of benefits (prevalence per 10,000 employment contracts) due to respiratory disease by principal diseases of the respiratory system and principal branches of activities, Brazil, 2003-2004.

NCEA	ICD-10															Total		
	J15+J18			J45			J44			J38			J43					
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
35	14.66	3.58	13.48	3.43	0.79	3.24	1.71	0.00	1.54	0.00	0.00	0.00	1.33	0.00	1.19	37.52	10.76	34.64
16	3.92	5.14	4.26	0.00	17.98	7.44	4.65	10.28	6.91	0.93	0.00	0.53	2.79	2.57	2.66	19.54	50.10	31.89
72	1.22	1.20	1.19	0.47	1.30	0.84	0.38	0.44	0.40	1.41	24.80	12.06	0.00	0.00	0.00	5.82	37.63	20.25
90	5.72	5.78	5.69	2.80	4.63	3.09	2.68	2.89	2.69	0.00	0.00	0.00	0.73	0.00	0.60	18.27	21.98	18.75
36	2.78	1.72	2.47	5.56	10.17	6.54	1.89	2.66	2.03	0.10	0.16	0.11	0.84	0.00	0.63	18.60	19.71	18.52
20	3.09	2.70	2.97	3.19	4.80	3.36	4.58	1.20	4.00	0.10	0.60	0.17	0.82	0.00	0.69	19.41	15.01	18.37
26	3.77	2.34	3.57	2.61	2.34	2.55	2.87	1.00	2.63	0.09	0.33	0.11	1.03	0.00	0.90	17.86	12.70	17.07
17	2.61	2.19	2.42	3.08	6.56	4.34	1.22	1.14	1.17	0.23	0.29	0.25	0.35	0.29	0.32	13.37	18.45	15.09
45	3.03	0.60	2.83	2.11	2.69	2.13	2.25	1.59	2.18	0.11	0.73	0.16	1.02	0.86	1.00	14.65	9.78	14.16
28	2.98	1.48	2.76	2.35	1.97	2.27	1.57	0.98	1.47	0.04	0.49	0.10	0.75	0.00	0.64	13.78	9.84	13.09
18	1.67	1.83	1.76	1.86	5.96	4.85	1.12	0.95	0.97	0.00	0.31	0.23	0.47	0.15	0.23	8.66	14.70	12.94
75	1.51	1.13	1.27	1.30	2.06	1.73	2.14	0.93	1.40	0.33	5.26	3.22	1.04	0.27	0.57	9.85	14.69	12.53
23	4.18	1.15	3.89	1.13	3.47	1.33	1.81	1.15	1.74	0.23	0.00	0.21	0.45	0.00	0.41	12.79	10.40	12.48
62	1.34	3.97	2.27	0.00	1.59	0.57	0.00	0.79	0.28	0.00	3.17	1.13	0.00	0.00	0.00	4.02	22.21	10.47
37	0.89	0.00	0.71	1.78	3.85	2.13	1.78	3.85	2.13	0.89	0.00	0.71	0.00	3.85	0.71	8.91	19.23	10.67
Outros	1.85	1.34	1.64	1.12	2.09	1.45	1.09	0.74	0.95	0.14	1.41	0.60	0.50	0.23	0.39	8.37	9.45	8.66
Total	2.06	1.35	1.77	1.35	2.34	1.69	1.32	0.81	1.12	0.15	2.11	0.86	0.58	0.23	0.44	9.56	10.92	9.92

ICD-10: tenth revision of the International Classification of Diseases; NCEA: National Classification of Economic Activities; 35: auxiliary transportation equipment manufacturing; 16: tobacco product manufacturing; 72: computer-related activities; 90: urban sanitation and sewage; 36: furniture manufacturing and diverse industries; 20: woodworking industries; 26: nonmetallic mineral product manufacturing; 17: textile products manufacturing; 45: construction; 28: metal products manufacturing; 18: clothing and accessories manufacturing; 75: public administration, defense and social security; 23: coke production, oil refining, processing of nuclear fuel and alcohol production; 62: air transportation; 37: recycling; J15: bacterial pneumonia; J18: unspecified pneumonia; J45: bronchial asthma; J44: other chronic obstructive pulmonary diseases; J38: other laryngeal and vocal cord diseases; J43: emphysema.

are not included in the group of work-related RDs.[15] However, the great concentration of pneumonias among employees in the "auxiliary transportation equipment manufacturing", especially in the shipbuilding industry, "urban sanitation and sewage" and "tobacco product manufacturing" groups speaks in favor of the potential association of these diseases with certain working conditions.

In the shipbuilding industry, there are various risk factors for RDs, such as exposure to asbestos, silica, inks, solvents, metallic dust, sawdust and solder. In this branch of activity, the association with asbestosis, mesothelioma, lung neoplasia[16] and silicosis[17] is already well established. In the "urban sanitation and sewage" group, there is exposure to bioaerosols, and the consequent inflammatory response of the airways has already been demonstrated,[18] whereas the workers of the "tobacco product manufacturing" group are exposed to tobacco dust, which can also damage the airways.[19;20] It is possible that, in these work environments, the risk factors involved promote alterations in the natural defenses of the airways and of the lung parenchyma, thereby favoring the colonization and multiplication of pathogenic germs that cause pneumonia.

There are various reasons for the finding of asthma as the second leading cause of temporary social security benefits due to RDs. The first is its high prevalence in Brazil. This pathology is responsible for 350,000 annual hospitalizations in the country and constitutes the fourth leading cause of hospitalizations under the Unified Health Care System.[21] In addition to its high prevalence, asthma is characterized as a chronic pathology with frequent exacerbations, and it is thereby considered the leading cause of incapacity among those within the economically productive age bracket.[2]

In addition to the factors already mentioned, this study clearly shows that occupational risk factors can significantly contribute to the high prevalence of temporary social security benefits due to asthma. The branches of activity involved in this study sample corroborated the importance of exposure to certain agents, such as tobacco, sawdust and textile fibers, as potential causative agents of this pathology. In industrialized countries, occupational factors are implicated in 9-15% of all cases of asthma in adults, and, in those countries, asthma has become the most common occupational DR.[22] Exposure to occupational factors is associated with a more severe clinical course of this pathology,[23] and the persistence of the exposure predisposes to clinical deterioration, which can lead to death. Early diagnosis, with removal of the exposure, improves prognosis, with consequent benefits to patients and public health.[24]

The third most prevalent pathology in this study sample, COPD, was, in 2003, the fifth cause of hospitalization under the Unified Health Care System in individuals older than 40 years of age.[25] The estimated prevalence in adults older than 40 years of age, in the city of São Paulo, is 15.8%.[25] The prevalence of work-related COPD

Table 5 - Distribution of mean duration and cost due to respiratory disease by groups of respiratory disease of Chapter X of the tenth revision of the International Classification of Diseases, Brazil, 2003-2004.

Groups	n	Mean duration	SD	Mean cost	SD
J00-J06	1.118	118.32	166.71	2.535.91	4.669.62
J10-J18	5.268	116.67	160.60	2.559.92	4.386.94
J20-J22	553	136.10	180.33	2.892.02	5.343.06
J30-J39	4.122	203.16	209.03	4.691.05	6.297.97
J40-J47	9.950	268.83	234.68	5.479.27	6.545.72
J60-J70	746	296.72	235.43	7.105.74	7.784.45
J80-J84	385	256.54	226.08	6.250.27	7.217.03
J85-J86	313	214.15	184.96	4.825.63	5.246.26
J90-J94	1.354	178.53	188.62	4.048.77	5.830.33
J95-J99	788	246.42	226.45	5.152.22	6.087.20
Total	24.597	209.68	218.54	4.495.30	6.123.03

J00-J06: acute infections of the upper airways; J10-J18: influenza and pneumonia; J20-J22: other acute infections of the lower airways; J30-J39: other diseases of the upper airways; J40-J47: chronic diseases of the lower airways; J60-J70: lung diseases due to external agents; J80-J84: other respiratory diseases which mainly affect the interstitium; J85-J86: necrotic and suppurative diseases of the lower airways; J90-J94: other pleural diseases; J95-J99: other diseases of the respiratory system.

is 19.2%, in general, and 31.1% among non-smokers.[25] In the work environment, exposure to dust, noxious vapor, noxious gases and fumes is related to this pathology.[26] In the present study, the branches of activity involved were those with exposure to tobacco, sawdust or inorganic dust, which are also considered classical risk factors.[26] It is possible that many workers in these branches of activity are smokers, since these branches involve workers with a low level of education, in whom the prevalence of smoking and COPD is higher.[25,27] The greatest incapacity identified in older age brackets is largely associated with the time of exposure to risk factors, which almost necessarily implies older ages and the actual dynamics of the development of the disease.

Despite the evidence, the low characterization of the technical relationship found in this study, both for asthma and COPD, leads to various organizational and economic factors, such as the lack of interest of employers in associating the diseases of their employees with labor, the low level of working-class organization, principally of the trade union organizations in various branches of activity, as well as technical and operational difficulties responsible for the characterization of benefits.[28]

Laryngeal and vocal cord diseases also had a relevant prevalence in this study sample. The inadequate or excessive use of the voice and exposure to irritating agents, such as dust, chemical products and tobacco, as well as the consumption of cold drinks, prolonged exposure to air conditioning, airway infections and respiratory allergies, are the principal causes of this group of pathologies.[29] In the present study, laryngeal and vocal cord diseases were associated with branches of activity in which there was exposure to air conditioning or excessive use of the voice, and these conditions lead to chronic inflammation, bleeding of the laryngeal mucosa and de-epithelization of vocal processes of the arytenoids, with the formation of ulcers, nodules and polyps.[30] The high characterization of the technical nexus with professionals in the information technology area, especially those of the female gender, might demonstrate that, in this branch of activity, females occupy activities that are related to the use of the voice more often than do males, and that they are more susceptible to effects caused by exposure to air conditioning.

The duration of temporary social security benefits due to RDs directly affects productivity.[12] Diseases related to external factors, among which are pneumoconioses, despite presenting low prevalence, correspond to greater duration and mean cost, since they are severe, incapacitating, progressive and irreversible diseases. This group is followed by the group of interstitial diseases, with characteristics similar to those already described, and by the group of chronic obstructive diseases of the airways, which are far more common and are characterized by periods of recurrent exacerbation and incapacity.

The comparison of these data with others in the literature is impaired due to the distinct differences among the systems of social security for workers in the world.[12] However, other researchers in Brazil have been using the same database for specific insults.[12,13,28] The use of the records from the INSS database proved to be a relevant instrument for epidemiological surveillance in labor health, since it allows us to measure the importance of diseases and study the risk factors to which this population is exposed. In this sense, it will contribute to the development of actions and policies that can reduce morbidity and improve health conditions of the population of employees. The present study brings an unprecedented contribution regarding the morbidity profile due to RDs in this population and should be disseminated among health professionals who deal with these pathologies, as well as among those who are responsible for occupational health and DR preventive policies, together with employees and employers.

Further studies assessing, in detail, what occurs in the work environments mentioned will be able to contribute to a better understanding of the results of the present study.

In summary, RDs account for a small fraction of temporary social security benefits granted by the INSS, which are related to the prevalence of RDs in the population, as well as to environmental and occupational risk factors. They also have a significant occupational impact and, in particular, a social impact, as well as having an impact on social security. Many of these diseases can be prevented through relatively simple interventions in the work environment.

References

1. Nelson DI, Concha-Barrientos M, Driscoll T, Steenland K, Fingerhut M, Punnett L, et al. The global burden of selected

occupational diseases and injury risks: Methodology and summary. Am J Ind Med. 2005;48(6):400-18.
2. Blanc PD, Ellbjär S, Janson C, Norbäck D, Norrman E, Plaschke P, et al. Asthma-related work disability in Sweden. The impact of workplace exposures. Am J Respir Crit Care Med. 1999;160(6):2028-33.
3. Didilescu C, Nițu M. The temporary work incapacity caused by respiratory diseases and tuberculosis in Romania and Dolj county in year 2000 [Article in Romanian]. Pneumologia. 2002;51(4):281-5.
4. Mesa FR, Kaempffer AM. Work absenteeism in Chile according to the type of work place [Article in Spanish]. Rev Med Chil. 2004;132(9):1100-8.
5. Algranti E, Capitani EM, Carneiro APS, Saldiva PHN. Patologia respiratória relacionada ao trabalho. In: Mendes R, editor. Patologia do Trabalho - atualizada e ampliada. São Paulo: Atheneu, 2003. p. 1330-97.
6. Murray JF. Doenças Respiratórias- Introdução. In: Wyngaarden JB, Smith LH, editors. Cecil Tratado de Medicina Interna. Rio de Janeiro: Guanabara Koogan,1993. p. 375.
7. Sociedade Brasileira de Pneumologia e Tisiologia. Doenças Respiratórias Ambientais e Ocupacionais. J Bras Pneumol. 2006;32(Supl 2):S19-S132.
8. Kuschner WG, Stark P. Occupational lung disease. Part 1. Identifying work-related asthma and other disorders. Postgrad Med. 2003;113(4):70-2, 75-8.
9. Organização Mundial da Saúde. Cid-10: Classificação estatística internacional de doenças e problemas relacionados à saúde. São Paulo: Edusp, 1996.
10. Brasil. Ministério do Trabalho. Secretaria de Segurança e Medicina do Trabalho. Segurança e medicina do trabalho. Manuais de Legislação Atlas, v. 16. São Paulo: Atlas, 1994. p. 32-56.
11. Eagan TM, Gulsvik A, Eide GE, Bakke PS. Occupational airborne exposure and the incidence of respiratory symptoms and asthma. Am J Respir Crit Care Med. 2002;166(7):933-8.
12. Santana VS, Araújo-Filho JB, Albuquerque-Oliveira PR, Barbosa-Branco A. Acidentes de Trabalho: custos previdenciários e dias de trabalho perdidos. Rev Saúde Pública. 2006;40(6):1004-12.
13. Boff BM, Leite DF, Azambuja MIR. Morbidade subjacente à concessão de benefício por incapacidade temporária para o trabalho. Rev Saúde Pública. 2002;36(3):337-42.
14. Sociedade Brasileira de Pneumologia e Tisiologia. Diretriz para pneumonias adquiridas na comunidade (PAC) em adultos imunocompetentes. J Bras Pneumol. 2004;30(Supl 4):S1-S24.
15. Brasil. Organização Pan-Americana da Saúde no Brasil. Doenças Relacionadas ao Trabalho: Manual de Procedimentos para os Serviços de Saúde. Brasília: Ministério da Saúde do Brasil, 2001.
16. Krstev S, Stewart P, Rusiecki J, Blair A. Mortality among shipyard Coast Guard workers: a retrospective cohort study. Occup Environ Med. 2007;64(10):651-8.
17. Ferreira AS, Moreira VB, Ricardo HM, Coutinho R, Gabetto JM, Marchiori E. Progressive massive fibrosis in silica-exposed workers. High-resolution computed tomography findings. J Bras Pneumol. 2006;32(6):523-8.
18. Heldal KK, Halstensen AS, Thorn J, Eduard W, Halstensen TS. Airway inflammation in waste handlers exposed to bioaerosols assessed by induced sputum. Eur Respir J. 2003;21(4):641-5.
19. Mustajbegovic J, Zuskin E, Schachter EN, Kern J, Luburic-Milas M, Pucarin J. Respiratory findings in tobacco workers. Chest. 2003;123(5):1740-8.
20. Yanev I, Kostianev S. Respiratory findings in tobacco industry workers. Chest. 2004;125(2):802.
21. Sociedade Brasileira de Pneumologia e Tisiologia. IV Diretrizes Brasileiras para o Manejo da Asma. J Bras Pneumol. 2006;32(Supl 7):S447-74.
22. Mapp CE, Boschetto P, Maestrelli P, Fabbri LM. Occupational asthma. Am J Respir Crit Care Med. 2005;172(3):280-305.
23. Le Moual N, Siroux V, Pin I, Kauffmann F, Kennedy SM; Epidemiological Study on the Genetics and Environment of Asthma. Asthma severity and exposure to occupational asthmogens. Am J Respir Crit Care Med. 2005;172(4):440-5.
24. Malo JL. Asthma may be more severe if it is work-related. Am J Respir Crit Care Med. 2005;172(4):406-7.
25. Sociedade Brasileira de Pneumologia e Tisiologia. II Consenso Brasileiro sobre Doença Pulmonar Obstrutiva Crônica (DPOC). J Bras Pneumol. 2004;30(Supl 5):S1-42
26. Meldrum M, Rawbone R, Curran AD, Fishwick D. The role of occupation in the development of chronic obstructive pulmonary disease (COPD). Occup Environ Med. 2005;62(4):212-4.
27. Sociedade Brasileira de Pneumologia e Tisiologia. Diretrizes para cessação do tabagismo. J Bras Pneumol. 2004;30(Supl 2):S3-76.
28. Barbosa-Branco A, Romariz MS. Doenças das cordas vocais e sua relação com o trabalho. Comum Ciênc Saúde. 2006;17(1):37-45.
29. Costa EA. Doenças otorrinolaringológicas relacionadas ao trabalho. In: Lopes AC, Amato Neto V, editors. Tratado de Clínica Médica. São Paulo: Roca; 2006. p. 258-71.
30. Costa HO. Distúrbios da voz relacionados com o trabalho. In: Mendes R, editor. Patologia do Trabalho. São Paulo: Atheneu; 2003. p. 1283-93.

About the authors

Simone de Andrade Goulart Ildefonso
Physician. Collective Health Department, University of Brasília, Brasília, Brazil.

Anadergh Barbosa-Branco
Professor in the Collective Health Department, University of Brasília, Brasília, Brazil.

Paulo Rogério Albuquerque-Oliveira
Security Engineer. Brazilian National Ministry of Social Security, Brasília, Brazil.