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Occupational accidents: social insurance costs and work days lost

ABSTRACT

OBJECTIVE: To estimate the proportion of occupational accident benefits granted within the total for health-related social security benefits, viewing the costs according to benefit type and the impact on productivity according to work days lost.

METHODS: Records of benefit decisions from the National Benefits System of the National Social Security Institute for the State of Bahia in 2000 were utilized. Occupational accidents were defined in accordance with the clinical diagnoses of External Causes, Injuries and Poisoning (SS-00 to T99) of the International Classification of Diseases, 10th Revision, and with the benefit type, which distinguishes between occupational and non-occupational health problems.

RESULTS: A total of 31,096 benefits granted due to illnesses or health problems were studied. Of these, 2,857 (7.3%) were caused by work accidents. Greater proportions were found among workers in the manufacturing, construction, electricity and gas industries, accounting for 18% of the total benefits. The costs of occupational accident benefits were estimated to be R\$8.5 million, with around half a million work days lost during the year studied.

CONCLUSIONS: Despite the fact that these data are under-reported and are restricted to workers who were able to receive health-related benefits, the findings reveal that avoidable health problems have a major impact on productivity and on the budget of the National Social Security Institute, thereby reinforcing the need for their prevention.

KEYWORDS: Accidents, occupational, economics. Worker's compensation, economics. Social security, economics. Social security, organization & administration. Absenteeism. Insurance, disability, economics.

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INTRODUCTION

Occupational accidents are avoidable and cause a great impact on productivity and on the economy, as well as great suffering. According to the International Labor Organization (ILO), about 270 million work-related accidents and about two million deaths occur around the world every year.⁷ Because they are potentially avoidable, their occurrence is an expression of negligence and social injustice.⁴ The costs of work-related accidents are rarely taken into account, even in countries that have made significant advances within the field of prevention.⁴ It has been estimated that 4% of the gross domestic product (GDP) is lost because of occupational diseases and health conditions, and this can go up to 10% in developing countries.⁷ In Brazil, based on the GDP for the year 2002, these estimated losses would be between US\$21,899,480 and US\$54,748,700. These figures reflect the low effectiveness of policies and programs for preventing work-related health problems. However, these estimates are limited to economic costs and do not include the emotional impact and the impact on families, which are difficult to quantify. There have been increasing numbers of studies making scientific estimates of occupational accident costs over the last few years. This has resulted from development of the field of health economics and the close relationship between work and economics, either because of the risk factors for accidents, or because of their effects on productivity.^{5,6,9,10,13,14}

In the United States, Leigh et al⁸ (1997) estimated a total cost of US\$145.37 billion for fatal and non-fatal occupational accidents in 1992. The direct costs from medical expenses such as treatment and rehabilitation, and some non-medical expenses such as transportation represented 34% of the total. The indirect costs represented by productivity and production losses, indemnities and salary compensations, among others, were estimated as US\$96.2 billion. Also according to this study, the total cost of diseases and work-related accidents was higher than those related to AIDS or Alzheimer's disease, and comparable to cancer-related costs. Other studies have also revealed the high costs of work-related accidents in countries such as China,¹⁴ and Lebanon,⁶ although it is difficult to compare the results because of differences in procedures and the specific characteristics of each country.

In Brazil, a substantial proportion of the direct costs from work-related accidents is the responsibility of the Ministry of Social Security. Through the National Institute for Social Security (INSS), the ministry has the mission of ensuring the right to social security. This is

defined as social insurance that has the aim of recognizing and granting rights to insured individuals, whose contributions are used for funding the expenses relating to various benefits. Among these are compensation for income loss when workers are unable to work because of disease, disability, advanced age, death, involuntary unemployment, maternity, or detainment. The INSS is responsible for collecting the contributions and funding the expenses relating to the payment of benefits within the National Benefits System (SUB). Within the context of social security, the term *work-related accidents* refers to injuries resulting from external causes, traumas and poisoning that have occurred in the working environment while performing occupational activities and/or on the journey to or from work, and also occupational diseases. The resulting benefits are named "accident benefits". However, in the present study, the definition of work-related accidents has been restricted to traumas due to external causes, injuries and poisoning, as commonly used in epidemiological studies.

There are few Brazilian studies on the costs of work-related accidents or their impact on productivity. In 1982, De Cicco³ (1984) conducted a pioneering survey on this topic, among all companies in Brazil with 500 or more workers registered. This study estimated the insured and non-insured costs corresponding to the first 15 days off work, which are borne by employers. Among the 263 companies analyzed, the insured cost was calculated as 7,354,068 Adjustable Obligations of the National Treasury (ORTN), the monetary reference at that time, and the total cost corresponded to 27,962 ORTN. The highest insured costs were found among companies in the transportation sector, followed by the paper and cardboard industry and communication and broadcasting companies. For other insured costs, the highest were the chemical and pharmaceutical industry, textile companies and communication and broadcasting companies. The companies with greatest total costs from occupational accidents were those in the chemical and pharmaceutical industry, transportation sector, and communications and broadcasting. Subsequently, Costa² (1993) analyzed the cost of work accidents to the INSS, using maintenance benefit data. Among 435,643 benefits analyzed, the estimate cost for urban areas was R\$87,834,269.45 (US\$41,044,051.15), while the cost for rural areas was R\$1,165,956.87 (US\$54,483,965.89) (amounts corrected to 2005 values). Some data on social security costs are published regularly in the Social Security Yearbook,^{*} but without analyses relating to activity groups, among other possible specifications. These data, although partial, need to be regularly estimated and published because of their economic importance

*Ministério da Previdência. Anuário Estatístico da Previdência Social. Brasília (DF); 2001.

and their relevance for the health system, in order to make entrepreneurs, managers and health professionals more sensitive towards this public health problem that is still neglected.

The objective of the present study was to estimate the contribution of benefits granted due to occupational accidents, within the total for health-related benefits, focusing on costs according to benefit type and the impact on productivity as measured by lost workdays.

METHODS

The study was carried out using records of authorizations for social security benefit payments from the National Benefits System of the INSS, for the State of Bahia, in the year 2000. The data correspond to all workers who held formal employment contracts, under the General System for Social Security (RGPS). These contractual ties are recorded in the National Register of Social Information (CNIS), by companies and workers, and are updated every month using data from the Guarantee Fund for Length of Service (FGTS) and other information from the INSS. Public-sector employees, self-employed workers and domestic employees were all excluded, because they are not eligible for the benefits under analysis.

The National Benefits System is a data registration system belonging to the INSS. The data are processed by DATAPREV, in which each social security event or occurrence that originates the granting of a benefit is registered. SUB allows retrieval of data on companies and employees, such as the coded clinical diagnosis based on the International Classification of Diseases, 10th Revision (ICD-10); field of economic activity as coded in the National Classification of Economic Activities (CNAE) that is used in Brazil; the number of the Work Accident Communication (CAT); start and finish date for each benefit; amount of the monthly payment; and the type of benefit. The latter is coded according to the nature of the health problem: whether it is occupational or not; severity of sequelae or injury; and the corresponding type of benefit (whether it is a case of retirement because of permanent disability or temporary medical leave, among others). In this study, only compensation claims authorized, i.e. granted, between January 1, 2000, and December 31, 2000, were considered. Payment authorizations correspond to approvals of claims. Such claims are only filed 15 days after the accident, when the expenses of salary compensation become a responsibility of the INSS. To estimate the costs, benefits relating to all occupational accidents

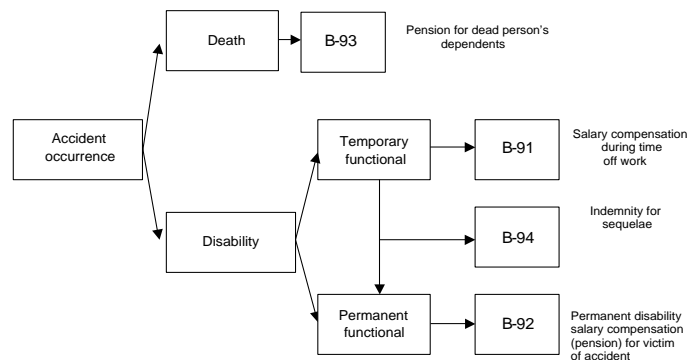


Figure - Work-related accident outcomes and correspondence with types of social security benefits in Brazil.

or diseases were considered; and for lost workdays, only the benefits corresponding initially to temporary absence from work were taken into account. The Figure presents a diagram of all the possible outcomes from a work-related accident and the respective types of social security benefits.

Benefits are generated following general medical referrals, or through issuing a CAT for occupational accidents or diseases (B91 to B93). In this latter case, the company needs to issue the CAT no later than the first working day following the accident. A copy is handed to the worker, to document the benefit claim request. However, the majority of cases are not characterized by an occupational diagnosis, i.e. by a so-called “causal connection”. These cases do not have a CAT form for claiming the accident benefit from the INSS. Nevertheless, many cases are identified as occupational accidents or diseases by expert examiners, from consultations that are apparently not occupational in the origin. Thus, many benefits in the B91 to B93 series do not have CAT data, and for these, an occupational linkage for the disease or health problem was identified within the social security attendance system.

The variable “work-related accidents” (1=yes, 0=other diagnoses) was defined on the basis of clinical diagnoses in ICD-10, and corresponded to cases of trauma due to external causes, injuries and poisoning (Chapter XIX), codes SS00 to T99, and the benefit granted corresponded to health problems of occupational nature from Series 90. The remaining cases were classified as other diagnoses. All B93 benefits, i.e. pensions granted to relatives of people who died from occupational accidents and diseases were considered as work-related accidents due to external causes. The other variables used were the type of benefit (B91 to B94), number of days off work, including the 15 days without benefit payment, the amount of the payment in reais, and the CNAE type, grouped into nine cat-

egories: agriculture, fishing and extractive industries; manufacturing or processing industry; civil construction, electricity and gas; transportation and communications; financial intermediation (banks, finance companies and insurance companies); education, leisure, cultural and sports activities; social and health services; and a category for information not declared.

The monthly cost of the benefit was calculated as the product between the duration in days and the daily amount paid, which were estimated from the duration and the annual amounts available in the database. Because of strong asymmetry, aberrant values in the distribution of these variables, and the need to use means, the values above the first percentile (1%) were replaced by the value corresponding to this cutoff point. Missing values were taken as the geometric mean corresponding to the distribution after normalization via logarithmic transformation. For ongoing benefit claims relating to pensions, the last day of the study reference year (December 31, 2000) was taken, even though many of them may have extended beyond this date. Cost analysis was carried out by estimating the distribution of the geometric means and standard deviations of the monthly cost and the total cost of the benefit, in reais, according to CNAE type and benefit type.

The number of lost workdays was also analyzed by means of the geometric mean and standard deviation, including the 15 days preceding the start of benefit payment. Because of the nature of pensions for relatives of people who died from work-related accidents (B93), these were excluded. Comparisons were made according to CNAE type, using mean and proportion ratios, when applicable. Statistical tests were not used, since the total number of benefits was considered. The analysis was carried out using the SAS

8.11 software. The identities of workers and companies were not recorded in the database and, since these were administrative data, the study protocol was not submitted to the Internal Review Board.

RESULTS

A total of 257,645 benefits granted by the INSS for workers covered by social security living in the State of Bahia in 2000 were identified. Of these, 39,883 (15.5%) corresponded to health-related benefits. From the latter, 822 (2.1%) were excluded because the clinical diagnosis was missing, leaving 39,061 records for the study analysis. Out of this total for health-related benefits, 11.7% related to occupational health problems, while occupational accidents (external causes, injuries and poisoning) represented 7.3%. Among all the occupational benefits, accidents represented 62.8%.

Among the benefits for health problems, the proportion of work accidents ranged from 4.3% for workers without CNAE registration to 18.0% for the manufacturing industry and for construction/electricity/gas companies. These figures were more than twice what was expected (proportion ratio, PR=2.47) (Table 1). Extractive activities from the primary production sector and commercial activities represented 13.5% and 13.0% of work-related accidents, respectively. These were 78% higher than the overall estimate. The largest contributions of work-related accidents in relation to occupational benefits were in the commerce/accommodation/food sector (77.4%) and construction/electricity/gas (75.3%). In the sector of financial intermediation and similar economic activities, the proportion of occupational accidents (39.3%) was 37% lower than what was expected (PR=0.63).

Table 1 - Proportion of benefits granted due to occupational accidents in relation to the total for health problem benefits and occupational benefits, according to the economic activity groups. State of Bahia, Brazil, 2000.

Economic activity	N	Benefits related to				N	Occupational health problems		
		General health problems		Proportion ratio CNAE/total	Occupational accidents		Proportion ratio CNAE/total		
	Occupational accidents	%			Occupational accidents	%			
Agriculture, livestock-rearing, forestry, fishing, extractive industries	941	127	13.5	1.85	189	127	67.2	1.07	
Manufacturing industry	2,432	438	18.0	2.47	664	438	66.0	1.05	
Construction, electricity and gas	2,033	366	18.0	2.47	486	366	75.3	1.20	
Commerce, accommodation, food	3,109	405	13.0	1.78	523	405	77.4	1.23	
Transportation, post office, telecommunications	1,491	151	10.1	1.38	261	151	57.9	0.92	
Financial intermediation, real estate activities, rental, services provided, public administration	4,469	254	5.7	0.78	647	254	39.3	0.63	
Education, leisure, cultural and sports activities	1,032	87	8.4	1.15	152	87	57.2	0.91	
Health and social services	735	60	8.2	1.12	97	60	61.9	0.99	
CNAE not declared	22,819	969	4.3	0.59	1,532	969	63.3	1.01	
Total	39,061	2,857	7.3	1.00	4,551	2,857	62.8	1.00	

CNAE: National Classification of Economic Activities

Table 2 - Distribution of accident-related benefits according to the type of benefit and CNAE groups. State of Bahia, Brazil, 2000.

Economic activity	B91		B92		B93		B94		Total	
	Sickness benefit for work-related accident with temporary disability		Retirement due to disability caused by work-related accident		Pension due to death by caused work-related accident		Accident benefit			
	N	%	N	%	N	%	N	%	N	%
Agriculture, livestock-rearing, forestry, fishing, extractive industries	108	4.6	9	3.3	6	4.1	4	3.8	127	4.4
Manufacturing industry	405	17.4	19	7.0	8	5.4	6	5.8	438	15.3
Construction, electricity and gas	308	13.2	30	11.0	27	18.4	1	1.0	366	12.8
Commerce, accommodation, food	361	15.5	15	5.5	23	15.6	6	5.8	405	14.2
Transportation, post office, telecommunications	131	5.6	8	2.9	11	7.5	1	1.0	151	5.3
Financial intermediation, real estate activities, rental, services provided, public administration	217	9.3	19	7.0	13	8.8	5	4.8	254	8.9
Education, leisure, cultural and sports activities	72	3.1	9	3.3	3	2.0	3	2.9	87	3.0
Health and social services	57	2.4	2	0.7	0	-	1	1.0	60	2.1
CNAE not declared	674	28.9	162	59.3	56	38.1	77	74.0	969	33.9
Total	2,333	100.0	273	100.0	147	100.0	104	100.0	2,857	100.0

The distribution of benefits granted for work-related accidents according to benefit type and CNAE groups is presented in Table 2. Around 33.9% of these benefits did not present CNAE data, and the proportion ranged from 28.9% for temporary disability assistance to 74% for pensions granted in relation to fatal accidents. As expected, 81.7% of the benefits related to temporary disability, followed by cases of permanent disability (9.6%). Workers in the latter category were granted retirement due to disability. Situations that led to death represented 5.1% of the total for accident-related benefits, while indemnities in cases of sequelae corresponded to 3.6%. With regard to the proportions of benefits granted for work accidents according to CNAE group, the highest estimates were concentrated in the construction/electricity/gas group: 13.2% for B91, 11.0% for B92 and 18.4% for B94; followed by the commerce/accommodation/food sector (15.5%, 5.5% and 15.6%, respectively), and the manufacturing industry (17.4%, 7.0% and 5.4%, in the same order).

The mean monthly cost to the Social Security System from occupational accidents was R\$294.00 (US\$137.38). According to the type of benefit, the highest monthly means were estimated for pensions related to deaths (R\$430.00/ US\$200.93) and permanent disability retirement (R\$425.00/ US\$198.60). The compensation for accidents had a mean value of R\$198.00 (US\$92.52), and the lowest value was R\$141.00 (US\$65.89) for the health/social services sector. The highest estimate corresponded to pensions due to disability in the group of transportation/post office/telecommunications and similar companies (R\$934.00/ US\$436.45), and this was close to the figure for the education/leisure/culture sector (R\$802.00/ US\$374.77) (Table 3). Table 4 shows the total cost of the benefits granted for occupational accidents in

Bahia in 2000, which was approximately R\$8,492,762.00 (US\$3,968,580.37). Salary compensations due to temporary time off work represented 71.4% of these costs, payment of retirement pensions for permanent disability represented 15%, pensions for worker's relatives in cases of death represented 10.6%, and accident indemnities represented 3.0% (B94). With regard to expenses relating to all benefit types and CNAE groups, 32% of them came from benefits without registration of the economic activity group, and these corresponded to R\$2,679,478.00 (US\$1,252,092). When the analysis was limited to B94, the proportion of expenses on benefits without CNAE data increased to 63.0%. On the other hand, among benefits for which the CNAE type was stated, the highest relative contributions to the expenses were from B91, B92 and B93, for the construction/electricity/gas sector (15%, 13%, and 19%, respectively), thus totaling R\$1,269,770.00 (US\$593,370.00) for the year. Similar values were obtained for the manufacturing industry, except for death-related benefits. For the B94 code, also in relation to fatal accidents, the highest relative costs occurred in the manufacturing industry (8%), but most of the claims did not present CNAE data.

The 2,333 benefits granted for temporary disability corresponded to 509,062 lost workdays and had a mean duration of 113 days (Table 5). Benefits without CNAE data represented 33% of the total, corresponding to 167,782 lost workdays in one year. Benefits with CNAE data showed higher proportions of lost workdays in the commerce/accommodation/food sector (15%), manufacturing industry (14.5%) and construction/electricity/gas sector (13.3%). The mean number of lost workdays ranged from 76 (health/social services) to 115 (financial intermediation and the like), which corresponded to 10,427, and 44,566

Table 3 - Mean monthly cost of social security benefits granted for work-related accidents, according to the type of benefit and CNAE groups. State of Bahia, Brazil, 2000.

Economic activity	B91		B92		B93		B94		Total	
	Mean cost (R\$)	Ratio CNAE/Total	Mean cost (R\$)	Ratio CNAE/Total	Mean cost (R\$)	Ratio CNAE/Total	Mean cost (R\$)	Ratio CNAE/Total	Mean cost (R\$)	Ratio CNAE/Total
Agriculture, livestock-rearing, forestry, fishing, extractive industries	253	0.90	347	0.82	529	1.23	222	1.12	267	0.91
Manufacturing industry	278	0.99	526	1.24	530	1.23	170	0.86	287	0.98
Construction, electricity and gas	317	1.13	423	1.00	516	1.20	385	1.94	337	1.15
Commerce, accommodation, food	243	0.87	387	0.91	457	1.06	174	0.88	255	0.87
Transportation, post office, telecommunications	454	1.62	934	2.20	612	1.42	464	2.34	482	1.64
Financial intermediation, real estate activities, rental, services provided, public administration	305	1.09	511	1.20	340	0.79	232	1.17	320	1.09
Education, leisure, cultural and sports activities	334	1.19	802	1.89	496	1.15	499	2.52	376	1.28
Health and social services	435	1.55	272	0.64	-	-	141	0.71	420	1.43
CNAE not declared	244	0.87	386	0.91	343	0.80	189	0.95	264	0.90
Total (reference)	280	1.0	425	1.0	430	1.0	198	1.0	294	1.0

lost days/year, respectively. The industrial sectors in which work accidents had the greatest impact on productivity were, in this order, commerce/accommodation/food (76,338 days, 15.0%), manufacturing industry (74,012, 14.5%), and construction/electricity/gas (67,607, 13.3%). Together, these totaled 217,957 days, representing 42.8% of the lost workdays caused by work-related accidents in one year.

DISCUSSION

The results show the great burden represented by work accidents, among the diseases and health problems that generate temporary disability for work, among workers who could receive social security benefits in Brazil.

Despite the large number of observations analyzed, the results from the present study should be considered with caution. Even when eligible, the majority of workers involved in accidents do not receive or seek benefits from the INSS. Several studies from different regions of Brazil have shown that the underreporting of fatal accidents is greater than 70%¹² and for non-fatal accidents it is over 90%.¹¹ In addition, the poor quality of social security data has been showed here, with one third of the observations presenting no CNAE data. In a study based on this same database, it was found that 62% of accident benefits did not have CAT data.¹² This indicates that the burden of work-related accidents in relation to the total number of health-related benefits granted could be much higher than what is reported in the present study.

Table 4 - Distribution of total cost (in reais) of benefits granted by the INSS for work-related accidents, according to the type of benefit and CNAE groups. State of Bahia, Brazil, 2000.

Economic activity	B91		B92		B93		B94		Total	
	Total costs (R\$)	%	Total costs (R\$)	%	Total costs (R\$)	%	Total costs (R\$)	%	Total costs (R\$)	%
Agriculture, livestock-rearing, forestry, fishing, extractive industries	281,362	5.0	41,680	3.0	24,687	3.0	11,885	5.0	359,614	4.0
Manufacturing industry	894,248	15.0	166,089	13.0	63,273	7.0	19,359	8.0	1,142,969	13.0
Construction, electricity and gas	935,006	15.0	161,931	13.0	172,833	19.0	5,469	2.0	1,275,239	15.0
Commerce, accommodation, food	734,967	12.0	86,651	7.0	118,837	13.0	12,961	5.0	953,416	11.0
Transportation, post office, telecommunications	595,362	10.0	89,904	7.0	56,768	6.0	7,070	3.0	749,104	9.0
Financial intermediation, real estate activities, rental, services provided, public administration	576,408	9.0	150,636	12.0	90,249	10.0	16,888	6.0	834,181	10.0
Education, leisure, cultural and sports activities	206,402	3.0	89,980	7.0	17,644	2.0	18,310	7.0	332,335	4.0
Health and social services	157,332	3.0	6,627	1.0	-	-	2,468	1.0	166,426	2.0
CNAE not declared	1,686,864	28.0	476,221	37.0	354,654	40.0	161,740	63.0	2,679,478	32.0
Total	6,067,951	100.0	1,269,719	100.0	898,945	100.0	256,150	100.0	8,492,762	100.0

Table 5 - Distribution of mean duration in days of benefits granted by the INSS for work-related accidents and lost workdays, according to the type of benefit and CNAE. State of Bahia, Brazil, 2000.

Economic activity	N	Mean duration	B91 Sickness benefit for work-related accident with temporary disability Ratio CNAE/ total	Total number of days lost	%
Agriculture, livestock-rearing, forestry, fishing, extractive industries	108	110	0.97	22,679	4.5
Manufacturing industry	405	96	0.85	74,012	14.5
Construction, electricity and gas	308	113	1.00	67,607	13.3
Commerce, accommodation, food	361	104	0.92	76,338	15.0
Transportation, post office, telecommunications	131	111	0.98	31,436	6.2
Financial intermediation, real estate activities, rental, services provided, public administration	217	115	1.02	44,566	8.8
Education, leisure, cultural and sports activities	72	107	0.95	14,215	2.8
Health and social services	57	76	0.67	10,427	2.0
CNAE not declared	674	137	1.21	167,782	33.0
Total	2,333	113	Reference	509,062	100.0

Other important limitations on the analysis were the lack of information on age and gender, the missing data from CAT records on accident characteristics, and the lack of a beneficiary identification number, which limited the checking of possible repeated cases. It should be noted that the data analyzed only reflect the most serious cases, i.e., those in which there were 15 or more days off work. Cases of shorter disability duration are not translated into costs for the social security system, but they have an impact on productivity and other costs for companies and employees. With regard to costs, only the expenses on benefit payments limited to a one-year period and to accidents with temporary leave from work were considered. Medical and administrative costs and those directly borne by companies and by the workers themselves and their relatives were excluded. Therefore, this is only an estimate of a small fraction of the total economic costs of work-related accidents, and does not take into consideration the costs that are unmeasurable or intangible because of their own nature.

Although data comparisons are compromised because of the differences in social security systems around the world, a study carried out in the United States⁵ found that permanent disabilities represented 5 to 10% of the benefits total, which is close to the estimate of 9.6% in the present study. No studies on social security data were found regarding the proportion of death-related benefits caused by work accidents, which would be an indicator of severity and lethality. However, lethality has been increasing in Brazil over the last few years.¹² Also in the United States, Boden & Galizzi¹ (1999) analyzed compensation claims paid as a result of work-related accidents with one or more weeks off work and estimated that 78% were related to total temporary disability, while

18% corresponded to partial disability. These results are similar to those in the present study, in which the benefits proportion was around 80%. However, this comparison is impaired because the benefits relating to death or total permanent disability were not taken into account in the American study. On the other hand, only 4% of the records were incomplete or unusable in the analysis.¹

The mean cost per month of benefits paid by the INSS due to work accidents in Bahia in 2000 reflects the profile of insured workers' salaries (IBGE, 2006).^{*} Industrial sectors with greater mean costs did not coincide with those with higher relative frequencies of cases of work accidents, which has a differential impact on total costs. The most important fact to consider, however, is the impact of these costs on the INSS, as shown by the total estimated cost of benefit payments due to work accidents.

The impact of work-related accidents on productivity and economic production was also large, as revealed by the number of lost workdays, in spite of the underreporting of these data. Excluding cases of retirement due to permanent disability and only taking into consideration formally registered workers (less than 50% of the total), there were more than half million lost workdays in the State of Bahia in 2000. The sectors with the greatest duration of time off work were financial intermediation, construction/electricity/gas, transportation/communications, and agriculture/fishing and the like. However, when the number of cases and total lost workdays were analyzed by sector, those with the largest economic losses through lost productivity due to work accidents were commerce/accommodation/food, manufacturing industry and construction/electricity/gas, all with figures very close to each other.

^{*}Instituto Brasileiro de Geografia e Estatística. Indicadores IBGE Pesquisa mensal de emprego e desemprego. Disponível em http://www.ibge.com.br/home/estatistica/indicadores/trabalhoerendimento/pme_nova/default.shtm [acesso em 12 maio 2006]

Work accident prevention programs are justified because of the loss of life, physical disability and great suffering imposed on people. These problems are common in Brazil, although largely avoidable.¹² Their occurrence indicate social injustice and should deserve priority in workers' health protection policies. Together, the findings from the present study indicate one facet, albeit partial of the relative dimension of work injuries among health-related benefits. They also indicate part, and possibly only a small part, of the total cost to society, as expressed by the amount paid as benefits by the INSS, and by the number of lost workdays. What can be seen is that the sectors of commerce/accommodation/food, manufacturing and construction/electricity/gas should deserve special prevention programs. The transportation sector was not ranked as highly as expected, considering the increasing numbers of traffic accidents and the poor condition of the country's road network, but this may reflect underreporting among these workers. The small number of cases coming from agricultural, livestock-rearing and extractive activities can also be highlighted. These activities are recognized as presenting high risk, which can be explained by the great informality of job contracts in this sector, or by the incipi-

ent degree of awareness of rural workers about their rights relating to social security. It is worth highlighting the large concentration of pensions due to deaths in the construction/electricity/gas and commercial sectors, which were much higher than the figures estimated for other CNAE groups.

In the light of the absence of diagnosis data from outpatient clinics, especially in the National Health System (SUS), and the underreporting of occupational health problems in hospitals and outpatient clinics, only primary data would be capable of giving trustworthy estimates. Thus, with a view to estimating the costs of work accidents, it is suggested that population-based studies should be conducted using primary data, taking into account the expenses of social security institutions, and also the medical costs borne by companies, workers and their families. Despite the limitations, the present study provides an original contribution regarding work-related accident costs. It is expected that this study will be disseminated among worker protection policymakers and among the managers and directors of companies, who continue to hold great responsibility regarding workers' safety.

REFERENCES

1. Boden LI, Galizzi M. Economic consequences of workplace injuries and illnesses: lost earnings and benefit adequacy. *Am J Ind Med.* 1999;36:487-503.
2. Costa SV. Impacto dos acidentes do trabalho: benefícios acidentários, um breve estudo. *Previd Dados.* 1993;8(3):21-33.
3. De Cicco FMGAF. Custo de acidentes. *Rev Bras Saúde Ocup.* 1984;45(12):55-67.
4. Dorman P. The economics of safety, health, and well-being at work: an overview. Geneva: ILO; 2000.
5. Durbin D. Workplace injuries and the role of insurance: claims costs, outcomes, and incentives. *Clin Orthop.* 1997;1(336):18-32.
6. Fayad R, Nuwayhid I, Tamim H, Kassak K, Khogali M. Cost of work-related injuries in insured workplaces in Lebanon. *Bull World Health Organ.* 2003;81:509-16.
7. International Labour Organization. Safety in numbers: pointers for the global safety at work. Geneva: 2003.
8. Leigh JP, Markowitz SB, Fahs M, Shin C, Landrigan PJ. Occupational injury and illness in the United States: estimates of costs, morbidity, and mortality. *Arch Intern Med.* 1997;157:1557-68.
9. Leigh J, Macaskill P, Kuosma E, Mandrik J. Global burden of disease and injury due to occupational factors. *Epidemiology.* 1999;10(5):626-31.
10. Miller P, Rossiter P, Nuttall D. Demonstrating the economic value of occupational health services. *Occup Med.* 2002;52(8):477-83.
11. Santana VS, Maia AP, Carvalho C, Luz G. Incidência de acidentes de trabalho não fatais: diferenças de gênero e tipo de contrato de trabalho. *Cad Saúde Pública.* 2003;19:481-93.
12. Santana VS, Nobre L, Waldvogel B. Acidentes de trabalho no Brasil entre 1994 e 2004: uma revisão. *Ciênc Saúde Coletiva.* 2005;10(4):841-55.
13. Weil D. Valuing the economic consequences of work injury and illness: a comparison of methods and findings. *Am J Ind Med.* 2001;40:418-37.
14. Wong TW. Occupational injuries among construction workers in Hong Kong. *Occup Med.* 1994;44:247-52.