



Workplace Accidents: Types, Frequencies, and Costs. Case of Workers Subject to the National Social Security Fund of Haut Katanga I, in the Democratic Republic of the Congo

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Abstract

Introduction: Workplace accidents represent a real public health problem, although they are usually under-reported. **Methodology:** We conducted a cross sectional survey aiming to contribute to the fight against occupational accidents in the province of Katanga in the Democratic Republic of the Congo. COVID-19 in the university residences of Lubumbashi. The data was encoded in Excel and exported to SPSS version 23 (SPSS, Armonk, NY) for analysis purposes. **Results:** Our results revealed that most of the victims were of medical sex (94.9%) and those whose age is between 26 to 50 years old were the majority (52.3%) working in the mining sector (54%). Partial disability was the most encountered (degree between 10% and 25%) in 85.1% of cases. We observed that there is a statistically significant difference between repair costs and outcome ($P = 0.000$). Thus, death costs more than amputation, healing, and sequelae ($P = 0.00$). **Conclusion:** Accidents at work must be taken seriously and their notification obligatory. Safety and hygiene at work are major assets in reducing or even eradicating occupational risks.

Subject Areas

Public Health

Keywords

Work Accident, Types, Frequency, Costs, National Social Security Fund, Provincial Directorate Katanga I, Democratic Republic of the Congo

1. Introduction

The protection of workers against occupational risks is one of the objectives of the International Labor Organization because safety and health at work are not only essential for decent work but also constitute an important factor in economic growth, productivity and development [1]. The International Labor Office estimates that the risks of poor health at work are higher in developing countries, including the Democratic Republic of the Congo (DRC) and in newly industrialized countries [2].

Accidents at work and occupational diseases are two occupational risks covered by two separate legislations, although the compensation of victims is based in both cases on similar principles [3]. Occupational risks have for too long been underestimated as determinants of public health, yet occupational diseases are numerous and weigh heavily on the health of populations: cancers, hearing disorders, respiratory diseases, joint diseases and musculoskeletal disorders, psychological and depressive disorders, dermatological and allergic disorders, occupational asthma and rhinitis, cardiovascular diseases, reproductive disorders, etc. [4].

Most of the time, with rare exceptions, the professional origin of these pathologies does not confer any specificity on them; they affect all the apparatuses and both the somatic and psychic spheres. The risk factors for these disorders are themselves very numerous and varied in nature [3] [4].

The classic chemical nuisances number in the tens of thousands and are present in many sectors of activity. Physical factors such as noise, cold or hot work, vibrations, radiation are extremely widespread. Biological agents are found in particular in health care settings or in the food and cleaning sectors and affect a large number of workers. There are still many physical and postural constraints: carrying heavy loads, working in uncomfortable and painful positions, repetitive movements. All in all, occupational risks do not concern one pathology or determinant but an immense world [4].

Workers in industries spend at least a third of the day at work which have a significant effect on their health and safety due to occupational and work-related injuries [5]. These occupational hazards constitute a major public health and development problem with serious health, social and economic consequences for workers and their employers [6] [7].

According to new estimates, more than 2.3 million people die each year due to fatal occupational accidents or work-related illnesses. This data means that every day around 7000 people die from these causes. In addition, more than 960,000

workers are injured on the job daily [8]. Over 90% of occupational hazards were in low- and middle-income countries, where the greatest concentration of the global workforce and low-level factories were found [3]. This problem is costing the world a loss of about 4% of gross national product [9] [10]. Despite this, only 5% - 10% of the working population in developing countries has access to some kind of occupational health and safety services [10].

In Lubumbashi, MBUTSHU in its cross-sectional study conducted to determine the incidence of musculoskeletal disorders of the hands and arms in Congolese cassava and maize millers exposed to vibration over the 12 months, noted that the overall incidence of musculoskeletal disorders of hand-arm was 25.8% among millers (compared to 5.2% among civilian workers; $P < 0.001$). The risk of developing musculoskeletal symptoms was seven times higher among suckers. Smoking, a number of cigarettes and daily exposure time were positively correlated with musculoskeletal disorders in millers [11].

Occupational accidents and work-related diseases cause high suffering and loss for individuals, organizations, communities and society. Work-related hazards are a significant problem worldwide and are particularly serious in developing countries. The total number of fatal accidents and fatal accident incidence rates has decreased over the last 10 years worldwide [12] [13]. The risks compensated by social security are financed on the basis of revenue from contributions. The amount of these contributions is also fixed by the actuarial calculation but the compensation goes through a mechanism of horizontal redistribution: from the active to the unemployed, from the healthy to the sick, from people of working age to retirees, etc. [4] [14].

2. Methodology

Our study was conducted at the national social security fund of the Katanga Provincial Directorate.

We conducted a cross-sectional descriptive retrospective study based on the documentary search of the archives of the national social security fund (Model sheets A1, A2, A3, A4, registers and accounting documents) covering all the files of declared work accidents. and treated with the services (Direction Katanga I) of the national social security fund located in Lubumbashi in the province of Haut-Katanga, over the period from January 1, 2016 to December 31, 2020.

The Provincial Directorate of the National Social Security Fund covers the city of Lubumbashi and the territory of Kipushi.

2.1. Study Population and Sampling

As part of our study, workers affiliated with the Provincial Directorate of CNSS Katanga I constitute our study population. Our sampling was exhaustive and its size is made up of 195 victims of professional risk declared and treated and deemed admissible at the Provincial Directorate of the CNSS Haut Katanga I during the period of our study, *i.e.*, from January 1, 2010 to December 31, 2019.

Note that no case of occupational disease was declared during our study period.

All workers affiliated to the Provincial Directorate of the National Social Security Fund Katanga I and victims of occupational risks declared during the period from 01/01 2010 to 31/12/2019 were included in the study.

While all workers affiliated to the CNSS Katanga I Provincial Directorate and victims of occupational hazards during a study period other than ours, as well as all workers who are victims of occupational hazards but are not affiliated or of undeclared occupational hazards or those whose files were deemed inadmissible to the Provincial Directorate the national social security fund Katanga I will be excluded from our study.

2.2. Data Collection

A collection sheet was developed for the occasion and served as a statistical data collection tool. These data come from the registration files.

We will use documents from the occupational risk department (Model sheets A1, A2, A3, and A4 in the appendix), registers of declarations of accidents at work and accounting documents for the payment of medical care and pensions.

In terms of input and encoding, the Excel 2013 software will serve as our tool. This software will also allow us to design our two data entry masks.

Once encoded, the databases were exported to SPSS version 23 (SPSS, Armonk, NY) and to EPI info version 7.1.0.6 of 08/09/2012 for analysis purposes.

The average Congolese Franc exchange rate set by the Central Bank of Congo was used for each year.

The GDP/capita considered is that of 2018 which is \$496/capita [15].

3. Results

In 95% of cases, the victims of accidents at work were in the majority represented (95%).

Victims aged between 26 and 50 were in the majority (51.3%) against those aged under 18 and those aged between 18 and 25 with all 1.5% of cases. Married victims represent 74.4% of cases followed by singles (24.6%) (Table 1).

Victims working in the mining sectors were in the majority (54.4%) (Figure 1).

Partial disability was the most encountered (degree between 10% and 25%) in 85.1% of cases (Table 2).

Sequelae were the most encountered after work accidents (43.1%), followed by recovery (29.7%), death (16.9%) and amputation (10.3%) (Figure 2).

The year 2010 cost more than the others (24.6% of the cost), followed by the years 2011, 2013, 2012 and 2014 with respectively 19.5%; 17.9%, 15.9% and 11.3%.

Table 3 shows that the year 2010 recorded more accidents than the other years (24.6%), followed by the year 2011 with 19.5% against the year 2019 which only experienced 0.5% of work accident cases.

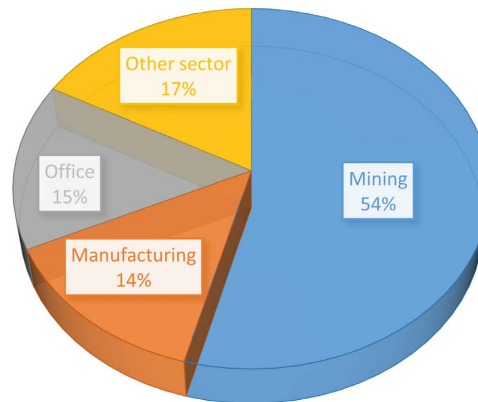


Figure 1. Distribution of victims by sector of activity.

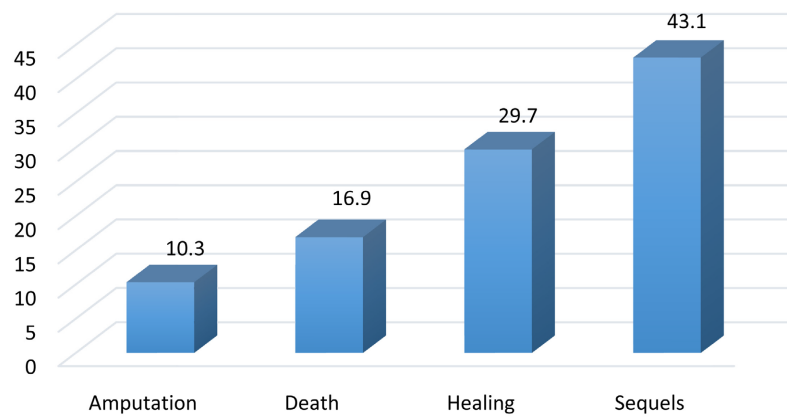


Figure 2. Distribution of workplace accident victims by outcome.

Table 1. Sociodemographic characteristics.

Variable	Frequence	Percentage
Gender		
Male	185	94.9
Female	10	5.1
Age (Age)		
<18	2	1
18 to 25	2	1
26 to 50	100	51.3
51 to 65	87	44.6
>65	4	2.1
Marital status		
Single	48	24.6
Divorce	2	1
Married	145	74.4

Table 4 indicates that deaths had a higher total cost (56.7%) than the others versus amputations (5.4%).

We observed that there is a statistically significant difference between repair costs and outcome ($P = 0.000$) (**Table 5**).

We find that death costs more than amputation, healing, and sequelae ($P = 0.00$) while sequelae cost more than healing, but this difference is not statistically significant ($P = 0.164$).

Table 2. Distribution of victims according to degree of disability.

Degree of disability	Frequency	Percentage
Partial disability	166	85.1
Total disability	29	14.9
Total	195	100.0

Table 3. Breakdown of workplace accidents by years of study.

Year	Frequency	Percentage
2010	48	24.6
2011	38	19.5
2012	31	15.9
2013	35	17.9
2014	22	11.3
2016	6	3.1
2017	11	5.6
2018	3	1.5
2019	1	0.5
Total	195	100.0

Table 4. Distribution of costs by outcome.

Outcome	Frequency	Average cost (\$)	Standard deviation	Minimum cost	Maximum cost	Total cost (%)
Amputation	20	837.3	1114.7	150.0	4841.7	16746.0 (5.4%)
Death	33	5367.8	3816.4	13.1	13512.9	177137.4 (56.7%)
Healing	58	334.1	648.5	0.0	3759.7	19377.9 (6.2%)
Sequels	84	1183.2	2201.2	131.0	11912.9	99393.0 (31.8%)
Total	195					312654.3574

Table 5. Comparison between the costs of treatment and the outcome of accidents at work (Anova test).

Total cost of treatment in dollars	sum of squares	ddl	medium square	F	P-value
Inter-groups	587644929.173	3	195881643.058	40.852	0.000
Intragroups	915830311.115	191	4794923.095		
Total	1503475240.288	194			

4. Discussion

Statistics in terms of work accidents show that about 2000 deaths per year are work-related and the rate of work accidents involving more than 3 days lost is 47.8 per 100,000 workers. This rate is equivalent to 250% of the average rate for the North Africa and Middle East region [16].

Table 1 shows us that in 95% of cases, male victims of work accidents were predominantly represented (95%). Victims aged between 26 and 50 were in the majority (51.3%) against those aged under 18 and those aged between 18 and 25 with all 1.5% of cases (**Table 1**). For WIN, in Brunei Darussalam, accidents were more frequent among men (98%), and migrant workers (86%), in the 30 - 39 age group (42.5%) [17]. In Brazil, the prevalence of work accidents was 2.79% and the majority of victims were between 18 and 24 years old [18].

MENEGON found that victims aged between 40 and 49 were in the majority (6.7%) [19].

Regarding marital status, married victims represent 74.4% of cases, followed by single people (24.6%) (**Table 1**). Accidents at work were single [20].

Victims working in the mining sectors were in the majority (54.4%) versus those working in manufacturing (13.6%) (**Figure 1**). On the other hand, in Brazil, the economic activity with the highest prevalence of accidents was the manufacturing industry [21].

Table 2 indicates that partial disability was the most encountered (degree between 10% and 25%) in 85.1% of cases. On the other hand, permanent disability was frequent in both Spain [22] and Brazil [23].

The sequelae were the most encountered after accidents at work (43.1%), followed by recovery (29.7%), death (16.9%) and amputation (10.3%) (**Figure 2**). Our results are similar to those of Spain [22].

Table 3 shows that the year 2010 had more work accidents than the other years (24.6%), followed by the years 2011, 2013, 2012 and 2014 with respectively 19.5%; 17.9%, 15.9% and 11.3%. This situation could be explained by the mining boom experienced by Greater Katanga (**Table 3**).

The curve is certainly experiencing a drop while noting that the years 2018 and 2019 had the lowest costs (1.5% and 0.5%).

The results of an Iranian study are similar to ours because in a retrospective study covering 10 years, from 2007 to 2016, the rates of work accidents were very high in the first five years [24].

Table 6. Comparison between the costs of amputation, death and healing.

Outcome		Mean difference	Standard error	P-value	95% confidence interval	
					Lower bound	Upper bound
Amputation	Death	-4530.4998	620.5214	0.000	-6280.729	-2780.270
	Healing	503.2003	567.8180	0.853	-1098.375	2104.775
	Sequels	-345.9481	544.8198	0.939	-1882.655	1190.759
Death	Healing	5033.7000	477.4639	0.000	3686.976	6380.424
	Sequels	4184.5516	449.8701	0.000	2915.658	5453.446
Healing	Sequels	-849.1484	373.8362	0.164	-1903.583	205.286

We observed that there is a statistically significant difference between repair costs and outcome ($P = 0.000$), as shown in **Tables 4-6**. Thus, death costs more than amputation healing as well as sequelae ($P = 0.00$) while sequelae cost more than recovery but this difference is not statistically significant ($P = 0.164$).

5. Conclusions

We conducted a cross-sectional study on the occupational risks recorded at the Directorate of the national social security fund of the province of Katanga I: Our study covered the period from 01/01/2010 to 01/31/2019, *i.e.*, ten (10) years.

The sequelae were the most encountered after accidents at work (43.1%), followed by recovery (29.7%), death (16.9%) and amputation (10.3%). The year 2010 saw the cost of care higher than the other years (24.6%). No cases of the occupational disease were reported. There were more work accidents occurring in the workplace (70%) than those occurring while commuting (30%).

It is important that the employer declares any social risk within the time limit for holistic care.

Conflicts of Interest

The authors declare no conflicts of interest.

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