

# Epidemiological and Medico-Legal Aspects of Occupational Injuries and Diseases (OID) in the Public Sector in Côte d'Ivoire from 2017 to 2021

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**How to cite this paper:** Tchicaya, A.F., Guiégui, C.P., Kra, A.A., Yomi, K. and Wognin, S.B. (2025) Epidemiological and Medico-Legal Aspects of Occupational Injuries and Diseases (OID) in the Public Sector in Côte d'Ivoire from 2017 to 2021. *Occupational Diseases and Environmental Medicine*, 13, 102-117.

<https://doi.org/10.4236/odem.2025.133007>

**Received:** May 6, 2025

**Accepted:** July 1, 2025

**Published:** July 4, 2025

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## Abstract

Occupational accidents and diseases remain a significant occupational health and public health problem in both the private and public sectors. To describe their epidemiological and medico-legal aspects, we conducted a descriptive study of accidents and illnesses contracted during service among public sector employees in Côte d'Ivoire from 2017 to 2021. **Method:** This was a cross-sectional study involving all occupational accidents and diseases affecting Ivorian public sector employees, reported to the Health Council from 2017 to 2021. **Results:** During the study period, 217 cases of work-related injuries were reported. The mortality rate was 3.1%. Only 2 cases of occupational disease were recorded compared to 225 cases of accidents. There were 195 men and 32 women, with ages ranging from 26 to 65 years and a mean age of 37 years. The majority of employees (53.3%) belonged to the health sector. The main injuries observed were fractures (58.6%). In this study, all workers experienced temporary total disability (TTD). The average duration of temporary total disability was 63.79 days. All victims were assigned a rate of permanent partial disability (PPD). All victims received compensation. **Conclusion:** The importance of prevention, the simplification of required documentation, and the sensitization of administrative authorities and civil servants regarding these procedures are essential.

## Keywords

Occupational Risks, Civil Servants, Accidents Occurring during Service, Illnesses Contracted during Service, Declaration, Recognition, Compensation

## 1. Introduction

According to Decree No. 68-82 of February 9, 1968, an occupational injury is considered to be an injury occurring as a result of or in the course of work, or while traveling from home to the workplace or the other way around; or during a travel paid by the employer [1].

An occupational disease, also called a disease contracted or aggravated in service or in the exercise of one's duties, is a pathology which is the direct consequence of the public service employee exposure to a physical, chemical or biological risk or which results from the conditions in which he carries out his professional activity [2].

Occupational injuries and diseases (OID) represent an enormous financial burden for public social protection systems in the world [3]. According to the International Labour Office (ILO), workplace accidents cause a loss of 4% of the world's gross domestic product each year [4]. Indeed, millions of people around the world are victims of work-related accidents and illnesses [5]. In France, 10% of civil servants were victims of work injuries out of a total of 1,270,968 accidents reported in 2019 [6] [7]. The number of cases of occupational diseases recorded in the same period was 2976 pathologies in the public sector [7] [8].

More than 1/6 of the world's work accidents occurred in Africa [9].

In Tunisia, 294 illnesses contracted in service were declared over the period 2012-2019 [10]. In Burkina Faso, 75 injuries at work were recorded in 2015 [11].

In Ivory Coast, Touré P [12] indicates that according to the National Education Ministry Litigation branch, the education system loses on average 300 teachers per year for health reasons. Also, the proportion of civil servants affected by cancers contracted in service in Ivory Coast in 2017 represented 44.12% of illnesses among these workers [13]. Despite progress in prevention, a large number of workers are still victims of physical and psychological injuries of work-related origin. In almost all states, these health problems are eligible for compensation based on legal frameworks that are often complex and little known to beneficiaries. To address this lack of information among civil servants and state agents on the mechanisms for recognizing and compensating for occupational injuries, we initiated this study, the objectives of which are as follows:

### 1.1. Over Goal

To study the epidemiological and medico-legal aspects of occupational accidents and illnesses contracted in the workplace among public sector employees in Côte d'Ivoire from 2017 to 2021.

### 1.2. Specific Goals

- 1) To determine the prevalence of accidents and illnesses acquired in service among public sector employees from 2017 to 2021.
- 2) Describe the nature of the injuries caused by these occupational accidents and illnesses among these workers from 2017 to 2021.

3) To analyze the professional and medico-legal consequences of injuries among these workers from 2017 to 2021.

## **2. Materials and Method**

### **2.1. Study Framework**

Our study took place within the health council and the department of pensions and occupational risks for civil servants at the Civil Service Ministry.

### **2.2. Health Council**

The Health Council is an advisory committee to the Public Health ministry office, located in Abidjan. Since its establishment by order No. 12 SP.CAB. of April 1, 1965, its objectives were reorganized a first time by order No. 47/MESP/CAB of May 3, 1977, then a second time by order No. 399/MSP/CAB of July 18, 1996, currently in force. Thus, the Health Council examines and gives its opinion on:

Requests submitted by civil servants and state agents regarding sick leave (3 months), convalescence leave, long-term leave (6 months), changes in administrative position due to illness, requests for medical evacuation outside Côte d'Ivoire, requests for spa treatment.

- The health council also has an organization and regulations which have been modified since its creation until the last decree.
- Operation mode.

The health council is contacted by the hierarchical authority of the sick or injured civil servant, or by the attending physician or any other practitioner at the request of the administration. The patient is then seen by a social worker who, after questioning, provides the patient with a consultation form and sends it to a medical expert with the civil service. The latter, after a thorough and rigorous examination of the patient, prepares a medical report. The various medical reports are then sent to the health council secretariat and reviewed on the day of the council meeting. The health council meets according to a specific schedule. The various decisions are made and the results are transmitted to the ministry responsible for the civil service, except for those concerning the subject originating from the police and defense.

The Personnel Management Directorate, which reports to the Directorate General of the Civil Service, receives the results, compiles a summary list, and cross-references the files of each person concerned across all ministries and payroll departments. For example, in the case of sick leave, the patient must, after the expiry of their leave, see the doctor again, who, after consultation, prepares a medical report that will be forwarded to the Health Council secretariat and reviewed on the day of the consultation. A decision is then made: either to extend the leave, to declare fitness for service, or to refer the file to the Reform Commission.

### **2.3. The Occupational Risks Department**

Located within the Ministry of Civil Service (Plateau district), the Occupational

Risks Department was established following the 1971 decree. The department's mission is the administrative management of occupational risks. It is also responsible for convening and organizing the annual Reform Commission. This commission's mission is to establish the administration's liability for the occurrence of the accident or illness in the file. Once a causal link is established, these injuries are eligible for compensation, which is provided by the General Retirement Fund for Civil Employees (GRFCE).

## 2.4. Materials

### ▪ Target research population

The target research population consisted of all public sector workers who suffered work-related injuries or occupational diseases during the period covered by the study.

### ▪ Sample and sampling

We conducted exhaustive sampling using the systematic random method. All cases meeting our inclusion criteria were recruited during the study period.

### ▪ Inclusion and non inclusion criteria

The following were taken into account:

Civil servants and government employees who suffered a workplace accident or illness contracted while on duty during the period 2017-2021, with the exception of victims with incomplete or insufficiently prepared files. **(Absence of response to certain items for some sections or insufficiently completed in cases where details were missing: Ex: Fracture not specified as open or closed.)**

## 2.5. Method

### ▪ Research model

We carried out a cross-sectional descriptive study on the files of victims of work injuries and occupational diseases in the public sector from 2017 to 2021.

#### Duration and time research

The study lasted three (3) months, from January 2023 to March 2023. It covered records of work accidents and illnesses contracted in service over the period 2017 to 2021, *i.e.* five years.

### ▪ Survey conduct

A research request authorization was sent to the heads of the various departments visited for our study. These were, respectively, the president of the health council and the deputy director of the civil service responsible for pensions and occupational risks. When the authorization was granted, an information note from these officials was sent to their respective secretariats. We then met with them to obtain their consent for the practical implementation of the survey on their premises. With their consent, during a working session with all staff, we explained the objectives of the study and the contents of the survey form. We reviewed the consultation records, medical certificates, and medical expert reports recorded during the study period.

#### **Data compilation.**

- Data compilation process

Data collection was carried out by reading registers, medical certificates and medical expert reports. These documents provided us with more or less complete information on the work accident and occupational disease, from the date of occurrence to the victim's compensation. This data was collected using a written questionnaire.

- Data compilation tools

Data collection was carried out using a survey form.

- Factors studied

**The files were examined meticulously one after the other, section by section. The parameters mentioned on the survey form were rigorously sought out in order to be recorded on this individual survey form.**

The main items of our questionnaire were as follows:

- ✓ Socio-professional data.
- ✓ Medical data.
- ✓ Professional impact.
- ✓ Legal medicine data.

- **Statistical processing and analysis**

Data processing was carried out at the same time as data collection. It consisted of first verifying the completion of the survey forms and then filling in the information collected using Microsoft Office Word 2016 and Excel 2016 software.

- **Ethical and administrative restraints**

The survey began after obtaining authorization from the heads of the various departments visited for our study. The data sheets were completed with due respect for confidentiality and anonymity. The results will be used for scientific purposes only, with strict respect for the confidentiality of the data collected.

### **3. Results**

#### **3.1. Number of Cases and Prevalence of Work Injuries and Occupational Diseases**

During the research period, 517 civil servants and government employees consulted the health council for health reasons. Workplace injuries and occupational diseases were the reasons for 227 consultations, representing a prevalence rate of 43.91%. These risks included two illnesses contracted while on duty (0.88%) and 225 accidents (99.99%), including seven fatalities (3.1%).

#### **3.2. Victims Socio-Professional and Demographic Data**

##### **3.2.1. Social and Demographic Characteristics**

The mean age was 37.22 years (Standard Deviation = 6.1), ranging from 26 to 65 years. The study population consisted of 195 workers (85.9%) of male sex, with a male-to-female ratio of 6.09. The majority of patients resided in the city of Abidjan (57.7%).

It should be noted that 44.93% of the records were not specified/documented.

**Table 1.** Distribution of workers victims of occupational accidents and diseases (OADs) by socio-demographic characteristics.

Socio-demographic Parameters	Number	Percentage (%)
<b>Age Ranges</b>		
[26 - 35 ans]	9	4.1
[36 - 45 ans]	96	42.4
[46 - 55 ans]	82	35.9
[56 - 65 ans]	40	17.6
<b>Sex</b>		
Male	195	85.9
Female	32	14.1
<b>Residence</b>		
Abidjan	131	57.7
Outside Abidjan	96	42.3
<b>Marital Status</b>		
Married	112	49.34
Single	13	5.73
Unspecified	102	44.93

### 3.2.2. Occupational Categories

Nurses accounted for 44.5% of the victims, followed by primary and secondary school teachers (15%).

**Table 2.** Occupational accident and morbidity (OAM) incidence among employees by job title.

Variables	Number	Percentage (%)
Administrative Assistant	2	0.9
Supervisory Agent	3	1.3
Technical Agent	7	3.1
Social Workers	3	1.3
Tax Auditor	3	1.3
Primary and Secondary School Teacher	34	15
Higher Education Teacher/University Lecturer/Professor	2	0.9
Nurse	101	44.5
Physician/Doctor	6	2.6
Water and Forestry Agent/Forestry Officer	30	13.2
Midwife	14	6.2
Other	22	9.7
Total	227	100

### 3.2.3. Relevant Ministry

Employees of the Ministry of Health, the Ministry of Education and the Ministry of Water and Forests represented 53.3%, 15% and 13.6% of the victims respectively.

### 3.3. Medical Data

#### 3.3.1. Occurrence Context

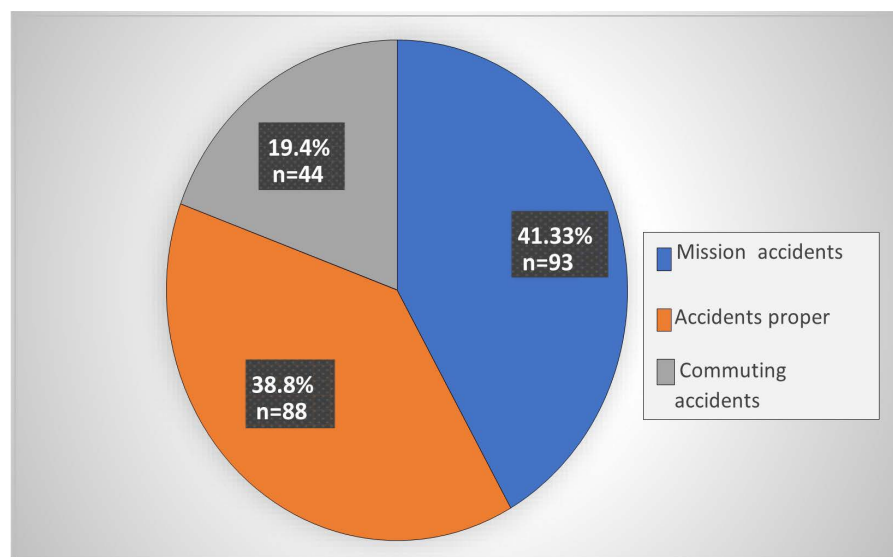
In our series, 76.8% of accidents occurred during road traffic.

**Table 3.** Breakdown of employees according to the circumstances in which the accident occurred.

Context of occurrence	Number	Percentage (%)
Firearm assault	15	6.6
Knife assault	10	4.4
Animal attack	2	0.9
Road traffic accident	173	76.8
Fall from height	17	7.5
Physical assault	5	2.2
Experimentation	2	0.9
Glass shards	1	0.4
Total	225	100.0

#### 3.3.2. Type of Accident

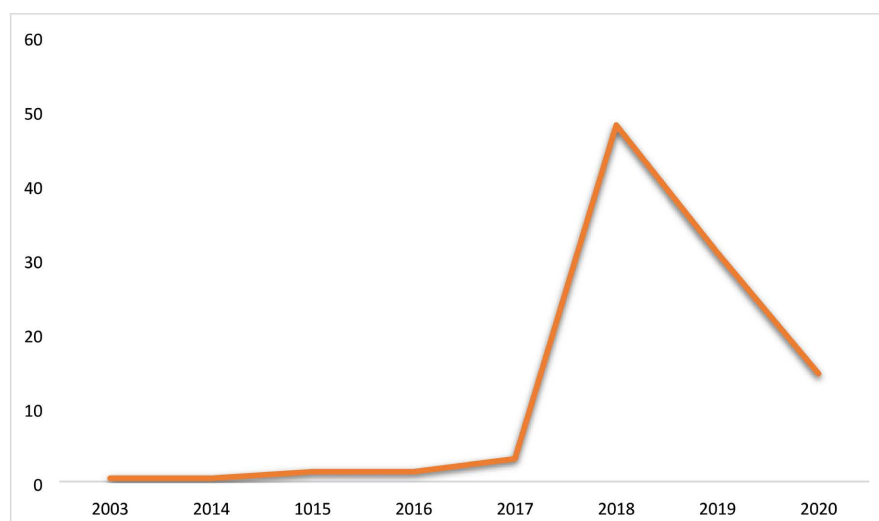
We found that 80.13% of accidents occurred during missions and during or on the occasion of service.



**Figure 1.** Breakdown of victims by disease and type of accident.

### 3.3.3. OI Number According to the Year of Occurrence

We found that 78.86% of OI occurred from 2018 to 2019.



**Figure 2.** Annual distribution of accidents at work and occupational illnesses.

### 3.3.4. Injuries Categories

Fractures and open wounds accounted for 58.6% and 30.8% of injuries resulting from workplace accidents, respectively. Two lung cancers were the diseases contracted by the workers included in the study, representing 0.9% of the risk.

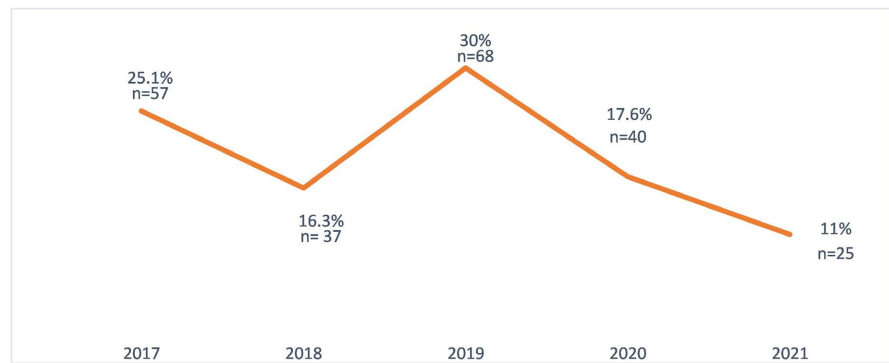
**Table 4.** Breakdown of employee victims of occupational injuries by type of injury.

Items	number	Percentage (%)
<b>Workplace accident</b>		
Open wound	70	30.8
Superficial traumatic injury	22	9.7
Sprain and strain	25	11
Concussion and internal traumatic injury	37	16.3
Crushing injury	1	0.4
Amputated limb	9	4
Fracture	133	58.6
Dislocation	21	9.2
<b>Occupational disease</b>		
Bronchopulmonary cancers/Lung cancers	2	0.9

## 3.4. Medical and Legal Data

### 3.4.1. OID Statement

OID reporting was variable with 2 peaks in 2017 (25.1%) and 2019 (30%).



**Figure 3.** Distribution of victims of occupational injuries by year of reporting.

### 3.4.2. OID Acknowledgement and Compensation

All reported accidents and illnesses contracted in service were recognized by the institution as being of work origin by the reform commission and compensated by the CGRAE.

### 3.4.3. Impact on Work Ability

After treatment, 175 workers returned to their jobs (77.1%), including 79 with adjustments and 96 files that did not mention the victim's future employment. However, for 52 employees, we reported 45 disability retirements and 7 deaths.

**Table 5.** Breakdown of employees suffering a work-related accident by type of return to work job.

Items	Number	Percentage (%)
<b>Return to work after treatment</b>		
Yes	175	77.1
No	52	22.9
<b>Modalities of return to work (N = 175)</b>		
Workplace adjustment	79	34.8
Not mentioned	96	42.7

### 3.4.5. Temporary Work Disability (TWD) Duration

TWI average duration was 63.79 days (Standard deviation = 48.66) Min = 10 days Max = 229 days.

**Table 6.** Breakdown of employees by duration of temporary total incapacity to work.

Temporary interruption of work (days not worked)	Number	Percentage (%)
≤21	45	19.8
[21 - 45]	50	22
[46 - 90]	93	41
≥91	27	11.9
Not specified	12	5.3
Total	227	100

### 3.4.6. After-Effects

Intermittent stiffness and pain accounted for 92.51% of progressive after-effects. A single employee could experience multiple after-effects.

**Table 7.** Breakdown of civil servant casualties by progressive after-effects.

Aftermath	number	Percentage (%)
Stiffness	111	48.9
Intermittent pain	99	43.61
Lameness	22	9.69
Trophic disorders	15	6.61
Post-concussion syndrome	12	5.28
Osteoarthritis	11	4.85
Oedema	11	4.85
Amputation	9	3.96
Phantom limb syndrome	8	3.52
Keloid scarring	6	2.64
Deformity	6	2.64
Limitation of movement	5	2.2
Joint laxity	4	1.76
Reduction in walking perimeter	4	1.76
Misalignment	4	1.76
Hemiplegia	3	1.32
Mental disorder	3	1.32
Other	16	7.04

### 3.5. Permanent Partial Work Disability (PPWD)

Permanent partial disability rates between 21% and 40% concerned 55.04% of OID victims.

**Table 8.** Breakdown of employee victims by level of Permanent partial disability.

Permanent partial disability (n = 218)	Number	Percentage (%)
[0% - 20%]	35	16.05
[21% - 40%]	120	55.04
[41% - 60%]	25	11.46
[61% - 80%]	30	13.76
[81% - 90%]	10	4.58

## 4. Discussion

We encountered administrative difficulties (administrative delays) in obtaining

authorization for investigations and accessing files. Information bias must be considered in this study; in particular, the health council's records of workplace accidents and occupational diseases were incomplete. Similarly, the local legal framework relating to occupational risk management in the civil service remains insufficient.

We analyzed 227 cases of occupational injuries reviewed by the health council over a five-year period, from 2017 to 2021. The annual number of reports during this period ranged from 25 to 68, with an average of 45. Only two cases of occupational illness were reported over these five years. According to the Occupational Risks Department of the Ministry of Civil Service, 134 occupational injuries were recorded between 2009 and 2013. No occupational illnesses were reported (**Table 1**).

In a previous study conducted over a 5-year period (1995-1999), Wognin and col. Observed an even lower reporting rate, encompassing 46 cases of occupational injury, including 1 case of illness [3]. We can observe a gradual increase in the reporting rate of occupational injuries. This increase is probably due to certain measures taken by the ILO in terms of prevention, such as the establishment of the World Day for Safety and Health at Work, which has been celebrated every April 28 since 2002, and the African Day for the Prevention of Occupational Risks, which is held on April 30 each year. These days aim to raise public awareness on issues of safety and health at work and to promote programs for the prevention of occupational accidents and diseases.

However, this rate remains due, on the one hand, to the numerous occupational risks to which civil servants and state agents are exposed in the exercise of their functions and, on the other hand, to the number of civil servants which, all jobs combined and as of December 31, 2020, was 237,483 [14] (**Table 2**). The high cost of medical examinations necessary for the diagnosis of occupational diseases, the absence of a legal definition and a table of occupational diseases specific to the civil service, could also reasonably constitute an obstacle to the constitution of disease recognition files. The victims, relatively young, had an average age of  $37.22 \pm 6.1$  years, unlike Kassi [15] in 2008 and Wognin *et al.* [16] in 2019 whose study population had an average age of  $45.9 \pm 10.54$  years and  $42.3 \pm 9.2$  years respectively (**Table 1**).

Induced lesions predominated in subjects whose age ranged between 36 and 55 years (78.3%) with a male preponderance (85.9%, a sex ratio of 6.09). This result is in accordance with the structure of the population of civil servants and state agents in 2020 where men are the most represented with a sex ratio of 1.84 [17]. The low number of women at work is highlighted by the International Labor Organization, although the gap between the activity rate of men and women is clearly declining worldwide [14]. This male dominance was described by Ayélo *et al.* who reported a male preeminence of 83.3%; the most represented age group was 30 - 40 years (40%) (**Table 1**).

Conversely, Akasson A. in a study carried out on medical staff at the health

council, observed a female predominance (57.60%) probably due to the high number of midwives [18]. This reflects a variability in the predominance linked to gender probably influenced by the profession concerned. Most of the victims who consulted the health council in our study resided in the city of Abidjan (57.7%). Similarly, Akasson A [17] in 2001 also noted that the regional directorate of Abidjan brought together the largest number of health workers requesting the health council. This observation seems normal because the city of Abidjan contains the majority of civil servants and state agents. The health sector was the most affected by these occupational risks with 53.3% of injuries, nurses, the most affected professional category (44.5%). These results are superimposable with those of a Tunisian study conducted from 2012 to 2019 in which the health sector represented 56% of victims of occupational diseases and the nursing profession, the most represented professional category (34.3%) [19]. Akasson A. in 2001 observed that nurses are the medical personnel who mostly consult the health council [17] (**Table 2**).

This predominance of nurses is consistent with the results of a study by the Ministry of Public Health (7625 nurses and midwives, compared to 1420 doctors) [20]. Indeed, medical or paramedical activity is correlated with a set of risks, in particular the risk of infection due to contact with patients and various biological fluids and tissues [21] [22]. Furthermore, health personnel seem better informed about the existence of the health council. Based on the rules of ethics, fraternity and mutual assistance, medical certificates are often issued to them free of charge.

For other civil servants, these elements often constituted real difficulties to overcome, the cost would seem prohibitive. The main injuries induced during accidents were dominated by fractures (58.6%) and open wounds (30.8%) (**Figure 1**). However, in Belgium, the Medex study noted a frequency of superficial wounds, a result that corresponds to the ILO classification which places superficial traumatic injuries and open wounds at the top of injuries due to work accidents [23]. The frequency of fracture injuries in our study would be due to the importance of road traffic accidents (77.1%) (**Table 3**). According to Ngaroua D. *et al.* in Cameroon, 37.5% of 232 patients hospitalized in the surgical department during the period from May 1 to July 31, 2014, were victims of a road traffic accident (RTA). Fractures constituted 67.8% of the induced traumas [24]. In Côte d'Ivoire, the issue of road traffic accidents, due to the severity of morbidity and mortality, is a priority public health concern. The State has made it a matter of governmental prevention by organizing extensive awareness programs in 2024. Moreover, measures aimed at reducing RTAs (Road Traffic Accidents) have been taken, notably speed limits under video surveillance, the introduction of points-based licenses, and the strengthening of the requirements for obtaining driver's licenses. However, road insecurity remains a concern with the emergence of motorcycle taxis, tricycles, and new private transport companies whose operators do not benefit from adequate training (**Table 4**).

Studies conducted in Africa report that road accidents predominate in the

occurrence of traumatic injuries with prevalences that differ depending on the country and the locality studied [25]. These data raise the issue of road safety, in particular the non-compliance with the highway code and the use of motorcycles without appropriate protection [26] [27]. The occupational diseases diagnosed during this period were exclusively pulmonary diseases, or 0.9%. According to CNAM statistics, the most common recognized occupational diseases in 2018 were musculoskeletal disorders (MSDs), respiratory diseases, and occupational deafness [28]. These occupational accidents and illnesses impacted the lives of the affected workers. Many returned to their jobs (77.1%) (Table 5). Significantly higher rates were found in similar studies conducted in the private sector by Duquesnoy *et al.* and Manou, who observed 93% and 96% return to work, respectively [29] [30]. Indeed, this high return-to-work rate does not always correspond to the level of functional recovery achieved. This return, often anticipated, can be explained by the difficult socioeconomic context, the drying up of financial resources, the loss of benefits related to the practice of one's profession, as well as legal restraints.

The results of the impact of these risks on the workplace cannot be analyzed objectively given the large number of files not containing these details (43.6%) (Figure 2 and Figure 3), probably linked to poor file management (poorly completed files). However, it is important to emphasize the proportion of deaths (3.1%). A much higher proportion had been observed in previous years by Wognin *et al.* (17.4%) [3]. By comparison, the private sector records approximately 31 deaths each year for 5500 accidents, or a proportion of 0.56%. On analysis, the 225 accidents notified correspond to clearly serious and fatal injuries (Table 4). Given the complexity of the procedure, the administrative delays in processing files (1 meeting per year for the reform commission) and the low level of benefits allocated, most victims give up. Minor illnesses and accidents are therefore excluded. All victims were granted temporary total incapacity for work (Table 6). The duration of these incapacities was specified in 94.7% of cases and varied between 10 and 229 days; the average was 63.79 days.

This result appears to be contrary to that of the Medex study on work accidents among Belgian civil servants; the author estimates that the vast majority of work accidents (80%) result in temporary incapacity for work of less than 30 days and are consolidated [22]. The vast majority of injuries were fractures (58.6%) (Table 4). In our series, unlike the Medex study where the most frequent injuries were superficial wounds and dislocations [22]. Our results are justified by the fact that the fracture generally consolidates within 6 weeks (Table 7). Furthermore, Chahnez M *et al.* in Tunisia, found that the duration of total temporary incapacity for work had a very variable distribution from one medical certificate to another, in accordance with our study where the standard deviation of the mean was 48.66 [30]. It was considered inadequate for the injuries described in 2.9% of cases. The duration of total temporary incapacity for work is based solely on clinical examination data (Table 8). It is independent of the circumstances of the traumatic event (accident, assault, etc.). There is currently no objective assessment scale for total temporary

incapacity for work available to physicians when drafting the initial medical certificate of assault and battery. This could explain the significant discrepancies between these incapacity ratings attributed by physicians for the same injuries. All victims presented with sequelae. The most common were stiffness (48.9%), intermittent pain (43.61%), limping (9.69%), and trophic disorders (6.61%). These were the classic broken bones after-effects.

Since the presence of after-effects is the criterion for awarding permanent partial disabilities, all victims benefited from them. The victims of work accidents and occupational diseases included in our study were compensated in 100% of cases.

## 5. Conclusions

Workplace accidents and occupational diseases remain a real occupational and public health problem. They affect a large number of workers in all sectors of activity. The reporting rate for occupational risks in the public administration remains low compared to the private sector, although it has improved considerably over the past two decades. The processes complexity, administrative delays, the injuries total cost covered by the victim themselves, and the low level of benefits allocated, negatively influence the reporting of occupational injuries in the public sector.

Furthermore, a significant number of public sector jobs expose employees to the risk of injuries and occupational illnesses. Notwithstanding the importance of prevention, the administration must increase its efforts to simplify records and raise awareness among civil servants about the procedures for reporting these diseases. It is desirable to increase the level of knowledge of civil servants and government employees about the procedures for reporting occupational injuries in the public administration. Indeed, work on this topic would be very similar to our own, whose interest lies in prevention.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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