

Epidemiological Profile of Occupational Accidents in an Agri-Food Sector Company in Libreville, 2013-2022

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Abstract

Objective: To characterize the epidemiological profile of occupational accidents (OAs) in an agri-food company in Libreville from 2013 to 2022. **Materials and Methods:** This retrospective, descriptive study covered a ten-year period (2013-2022) and was based on both physical and electronic records of occupational accidents, as well as reports submitted to the National Social Security Fund (CNSS). All occupational accidents occurring among workers from two production plants during the study period were included anonymously. The variables analyzed comprised sociodemographic and occupational characteristics, circumstances surrounding the accidents, causative factors, types of injuries, and medicolegal outcomes. Data analysis was performed using Epi Info version 7.2.6.0. **Results:** A total of 136 occupational accidents were documented, with 86.8% involving male workers and an average age of 48.5 years; 85.3% of cases occurred among laborers. Most of accidents took place during daytime hours (71.3%) and at the production site (69.1%). The primary circumstances were direct impacts (32%) and falls (19.1%). Traumatic injuries predominated (47.8%), chiefly affecting the lower limbs and hands. Nearly 92% of these incidents resulted in work absences, amounting to a cumulative total of 1274 days. **Conclusion:** Experienced workers were found to be at greatest risk of occupational accidents. Enhanced preventive strategies are essential to mitigate both the incidence and severity of such events.

Keywords

Occupational Accident, Agri-Food Sector, Libreville

1. Introduction

An occupational accident, regardless of its cause, is defined as any incident that occurs by reason of or during the course of work, affecting any salaried individual or worker, in any role or location, employed by one or more employers [1]. Such incidents are unexpected and unplanned, resulting in bodily injury or death for one or more workers [2]. Occupational accidents and work-related diseases represent the primary occupational hazards, necessitating that employers implement preventive measures to safeguard workers' health from work-related deterioration [3]. According to the International Labour Organization (ILO), 2.78 million workers die annually due to occupational accidents, while 395 million workers experience non-fatal occupational accidents each year [4] [5].

Numerous studies have been conducted globally on occupational accidents and their consequences. Asia accounts for 65% of work-related mortality, followed by Africa (11.8%), Europe (11.7%), the Americas (10.9%), and Oceania (0.6%) [5].

The manufacture of dairy products and fruit juices involves the use of cutting and slicing machinery, heating equipment, and the handling of chemicals, often in work environments that are crowded and slippery. These conditions expose workers to risks of injury, falls, and burns.

In 2022, a total of 664 non-fatal occupational injuries were reported to the National Social Security Fund (CNSS) in Gabon [6]. Nevertheless, company-specific data are limited, which hinders targeted risk assessment and the development of effective preventive strategies. Against this backdrop, the present study was undertaken to describe the epidemiological characteristics of occupational accidents in an agri-food sector company located in Libreville.

2. Population and Methodology

2.1. Study Type, Setting, Period, and Duration

This research employed a retrospective design with both descriptive objectives, focusing on occupational accidents. The study was conducted within the medical department of a leading agri-food company based in Libreville. Specializing in the production of dairy products and fruit juices, the company operates two factories exclusively located in the capital, with distribution networks extending nationwide.

The investigation encompassed all occupational accidents recorded over a ten-year period, from January 1, 2013, to December 31, 2022. One hundred and ninety-six (196) work accidents were reported during this period. The documentary database used consisted of work accident registers (physical and electronic) and work accident declaration sections from the National Social Security Fund (CNSS). Data collection and analysis were carried out over a five-month interval, from June 15 to November 15, 2024.

2.2. Inclusion Criteria

All cases of occupational accidents occurring between 2013 and 2022 were included, provided they involved regularly employed workers in factories producing

dairy products and fruit juices, and were properly documented in both the registers and the occupational accident declaration forms.

2.3. Exclusion Criteria

Accidents that occurred outside of working hours and did not meet the definition of commuting accidents, as well as occupational accidents that took place before or after the study period, were excluded. Workplace accidents for which the records were incomplete.

2.4. Data Collection

Data were collected using a pre-designed survey form, developed from the occupational accident declaration template. The form captured sociodemographic and professional information of workers affected by occupational accidents, the type of accident (distinguishing between on-site workplace accidents and commuting accidents), the nature of the injuries sustained, and the medicolegal consequences.

2.5. Data Collection Method

Survey forms were completed using existing data from both physical and electronic registers documenting occupational accident (OA) declarations, as well as OA declaration forms submitted to the CNSS. Data collection was conducted by a team comprising an occupational physician and two State Registered Nurses.

2.6. Variables

Sociodemographic and occupational variables included age, sex, educational attainment, job position, contract type, professional category, and tenure in the position. Accident-related variables encompassed the date, time, and location of occurrence, the circumstances and causal agent, as well as the severity of the incident. We classified the severity into three categories and three scores:

Category 1: Minor injury (Score 1)

- Work stoppage of less than 3 days;
- No hospitalization;
- Minor injuries: Scratches, bruises, first-degree burns, superficial wounds;
- No functional impact.

Category 2: Moderate Injury (Score 2)

- Work stoppage of more than 3 days;
- Hospitalization of less than 48 hours;
- Injuries requiring specific medical care (suture, splint, temporary immobilization);
- Transient functional impact.

Category 3: Severe Injury (Score 3)

- Work stoppage of more than 30 days;
- Hospitalization of 48 hours or more;
- Injury with permanent sequelae or partial/total disability;

- Life-threatening.

Injury characteristics were documented with respect to their nature and anatomical location. Preventive measures assessed included the presence of information and training sessions on occupational accident prevention within the factory, the existence of an occupational health service, and the presence of a Health and Safety Committee (CSST) at the time of the incident. Medicolegal consequences were evaluated through the occurrence of victim hospitalization and the number of days of work absence.

2.7. Limitations of the Study

The exclusive use of registers and declaration forms as a documentary source limits accuracy. It is not certain that all accidents were recorded, particularly those that did not result in work stoppage or those that were ignored by the victims or their superiors.

The impossibility of knowing the size and composition of the annual workforce to enable the calculation of the incidence of accidents for each year.

The relatively small sample size of 136 cases over 10 years in a continuous production company could suggest underestimation or underreporting if the company has a large workforce.

2.8. Data Processing

Collected data were entered into an Excel spreadsheet and analyzed using Epi Info version 7.2.6.0. Graphical representations were generated with Excel 2013. Qualitative variables were reported as proportions, while quantitative variables were presented as means \pm standard deviation.

3. Ethical Considerations

This study was conducted following approval from company management. Strict confidentiality of data was maintained throughout the process.

The work described does not involve experiments on patients, subjects, or animals. All principles of the Declaration of Helsinki regarding human subjects in research were observed during the data collection process. Data collection was performed anonymously. The findings of this study are utilized exclusively for scientific purposes.

4. Results

A total of 136 occupational accidents were recorded between January 1, 2013, and December 31, 2022.

4.1. Socio-Demographic and Occupational Characteristics of Accident Victims

The study population consisted of 18 women (13.2%) and 118 men (86.8%), corresponding to a male-to-female ratio of 6.5.

The mean age was 48.5 years (SD = 7.4), with ages ranging from 29 to 68 years.

Employees younger than 45 years accounted for the highest proportion of accident cases, representing 63.2% of the total.

The average tenure within the company was 16 years (SD = 6.5), with a range from 1 to 27 years.

At the time of the accident, all workers were registered with the social security fund, and 97.1% held permanent employment contracts.

Manual workers constituted the most affected socio-professional category, as detailed in **Table 1**.

Table 1. Distribution of the socio-professional characteristics of the workers.

Characteristic	Number (n)	(%)
Sex		
Male	118	86.8
Female	18	13.2
Age (years)		
<35	15	11
[35 - 40]	32	23.5
[40 - 45]	39	28.7
[45 - 50]	22	16.2
≥50	28	20.6
Years of Service		
<10	46	33.8
[10 - 20]	67	49.3
≥20	23	16.9
Professional Status		
Executive	5	3.7
Supervisor	15	11
Worker	116	85.3
Type of Employment Contract		
CDD	4	2.9
CDI	132	97.1

CDD: fixed-term contract; CDI: permanent contract.

4.2. Occupational Accident Data over a Ten-Year Period

Occupational accidents affected 6.6% (n = 9) of administrative personnel, 44.9% (n = 61) of commercial staff, and 48.5% (n = 66) of production staff.

Given that the company operates on a continuous shift basis, 71.3% of work accidents occurred between 07:00 and 15:00 (first shift), 24.3% between 15:30 and 22:00 (second shift), and 4.4% between 22:30 and 06:30 (third shift).

Incidents occurring at the workplace accounted for 69.1% (n = 94) of all cases, while commuting and off-site accidents constituted 30.9% (n = 42). The highest accident rate, 22.8%, was observed in 2013 and 2014, as illustrated in **Figure 1**.

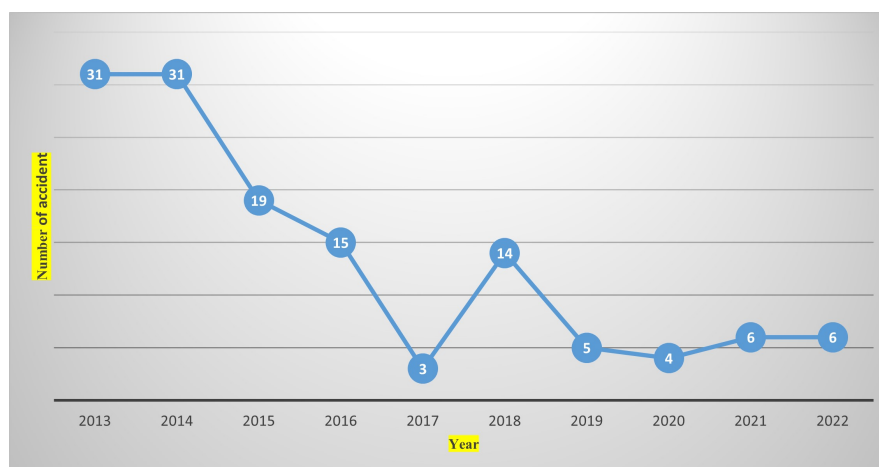


Figure 1. Trends in the number of accidents over a 10-year period.

The analysis of accident distribution by month and by year indicates that there is no significant monthly predominance in accident occurrence, as illustrated in **Figure 2** below.

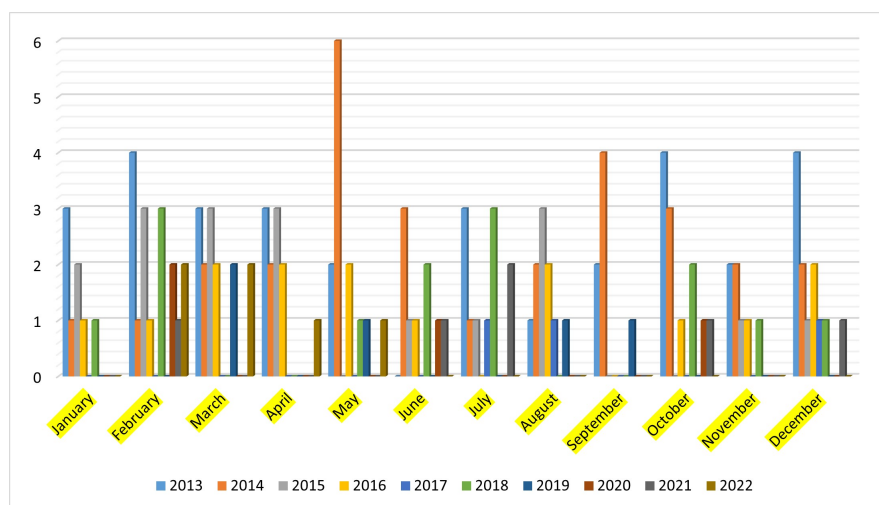


Figure 2. Distribution of occupational accidents by month and by year.

4.3. Injury Data

Direct impacts (32%) and falls involving the individual (19.1%) were the primary circumstances under which accidents occurred, while manual handling (42.6%) and the work environment (20.6%) constituted the leading causes of these incidents.

Traumatic injuries accounted for the most common type of lesion, representing 47.8% of cases. The lower limbs (25.7%) and hands (21.3%) were the most frequently affected anatomical sites, as detailed in **Table 2**.

The mean duration of work absence was 9.4 ± 9.5 days, with a range from 1 to 52 days.

Occupational accidents resulting in work stoppage affected 127 workers (92%), with a cumulative total of 1274 days of work lost.

Nine injured workers (6.6%) required hospitalization following their accidents.

In our study, 95.6% ($n = 130$) of injured individuals were declared fully recovered, while 4.4% ($n = 6$) experienced recovery with lasting sequelae.

Table 2. Distribution of occupational accidents according to circumstances of occurrence, causal agent, nature, and anatomical location.

Variables	Characteristic	Number (%)
Accident circumstance	Physical assault	7 (5.1)
	Road traffic accident	8 (5.9)
	Direct impact	44 (32.3)
	Fall of the individual	26 (19.1)
	Falling object	8 (5.9)
	Chemical exposure	14 (10.4)
	Postural strain	18 (13.2)
	Laceration by sharp object	11 (8.1)
Causal agent	Person	7 (5.1)
	Moving machinery	11 (8.1)
	Manual or mechanical handling	58 (42.6)
	Workplace environment	28 (20.6)
	External environment	5 (3.7)
	Chemical substance	14 (10.3)
	Vehicle	13 (9.6)
Nature of injury	Closed injury	50 (36.8)
	Open injury	15 (11)
	Non-traumatic wound	19 (14)
	Burn	10 (7.3)
	Sprain	11 (8.1)
	Ocular injury	12 (8.8)
	Muscle contracture	19 (14)
Injury location	Head (excluding eyes)	11 (8.1)
	Upper limb (excluding hands)	10 (7.4)
	Lower limb	35 (25.7)
	Hand	29 (21.3)
	Trunk	24 (17.7)
	Eyes	12 (8.8)
	Multiple sites	15 (11)

4.4. Occupational Accident Prevention Measures

The Occupational Health and Safety Committee (CSST) was established in 2015.

A risk assessment was conducted, resulting in the development of a prevention

plan. However, no occupational accident analyses were performed.

Employees received annual medical examinations on-site within the company. Personal protective equipment (PPE)—including coveralls, gowns, safety shoes, masks, gloves, and goggles—was provided to all workers.

Although workers did not receive formal first aid training, they occasionally participated in brief safety awareness sessions.

5. Discussion

A total of 136 occupational accidents (OAs) were recorded between January 1, 2013, and December 31, 2022, corresponding to a ten-year period.

5.1. Socio-Professional Characteristics

The study population consisted of 86.8% male workers, with a mean age of 48.5 ± 7.4 years (range: 29 - 68 years) and an average length of service within the company of 16 ± 6.5 years.

The male predominance among occupational accident (OA) cases observed in this study is consistent with findings reported internationally. For instance, Atitche *et al.* [7], in their investigation of the epidemiological profile of occupational accidents in a Togolese cement factory; Dia *et al.* [8], in their study of the characteristics and outcomes of occupational accident victims at the Social Security Fund of Dakar; Lenge N *et al.* [9], in research on workplace accidents at the General Quarries and Mines Company in the Democratic Republic of Congo (DRC); Hami *et al.* [10], in their analysis of OAs in the construction sector in Morocco; and El Amri *et al.* [11], at the Ibn Rochd University Hospital in Casablanca, all reported male predominance rates of 100%, 99.22%, 98.82%, 91.8%, and 97%, respectively.

This predominance of male victims may be partially attributed to the nature of the sectors involved, which frequently demand physical strength. Conversely, N'Guessan *et al.* [12], in a study of occupational accidents in a cashew nut processing plant in Côte d'Ivoire, and Prasad *et al.* [13], in similar research, identified a predominance of female victims, as most positions in these facilities require dexterity rather than physical exertion.

The mean age observed in our study, with a predominance in the [35 - 45] years age group, closely aligns with that reported by Lenge N *et al.* (47 years), but exceeds the averages documented by Dia *et al.* (37.55 years), N'Guessan *et al.* (36.7 years), and Atitche *et al.* (44.22 years). These findings indicate that occupational accidents (OAs) primarily impact adult populations, irrespective of the sector of employment.

In our cohort, workers with over 10 years of experience accounted for the majority of OAs, representing 66.2% of cases. Similarly, Lenge N *et al.* observed that the highest OA incidence occurred among employees with more than 16 years of experience. The confidence developed over years of service may contribute to a disregard for safety protocols, potentially explaining the increased occurrence of

OAs among experienced workers. Supporting this, Rahmani *et al.* [14] reported in a study of Iranian electricians that worker negligence was implicated in 75% of fatal accidents.

However, this trend contrasts with findings from Mikponhoué *et al.* [15], who, in a study on the etiological factors and costs of OAs in a Burkina Faso agri-food company, and N'Guessan *et al.*, reported high OA rates of 83.44% and 74.9% respectively among workers with less than 10 years of experience.

Such discrepancies may be attributable to the higher mean age and seniority of participants in our study compared to those in previous investigations.

Furthermore, the working class constituted the most affected group in our study, accounting for 85.3% of OAs. This observation is consistent with prior research: Panda *et al.* [16] in the DRC textile industry, Owona *et al.* [17] in Douala's industrial sector, Wasungu *et al.* [18] in Togo's mining sector, and Tchicaya *et al.* [19] all reported significant OA incidences among the working class, at 88%, 54.4%, 64.2%, and 84% respectively. The predominant involvement of workers in production processes likely accounts for their increased exposure to occupational accidents relative to other professional categories.

5.2. Work Accident Data over the Past 10 Years

The company operates on a continuous shift basis, with 71.3% of occupational accidents occurring between 7:00 a.m. and 3:00 p.m., corresponding to the first work shift. Shabgard *et al.* [20], in a study examining factors influencing occupational accidents in an Iranian electricity company, Bilim *et al.* [21] in Türkiye, and N'Guessan *et al.* among cashew nut and cotton workers [22], all reported that more than half of occupational accidents occurred during the first work shift. This finding contrasts with that of Chimamise *et al.* [23], who observed among miners in Zimbabwe that the majority (73.1%) of serious accidents took place during night shifts. This discrepancy may be attributed to the nature of the activities involved; in our company, most operations are conducted during the day, whereas the night shift is primarily dedicated to maintenance and the preparation of production activities for the following day, which requires fewer workers, in contrast to the mining sector where night-time operations are more prevalent.

Workplace accidents constituted 69.1% of all cases. Multiple surveys have reported a higher prevalence of occupational accidents occurring within companies compared to commuting-related incidents. For example, Atitche *et al.* in Togo reported a rate of 67.1%, Lenge N *et al.* in the Democratic Republic of Congo observed 85.53%, and N'Guessan *et al.* in Côte d'Ivoire reported rates of 67.1%, 85.53%, and 97%, respectively. The literature consistently indicates that the majority of occupational accidents occur in the workplace, underscoring the necessity to reinforce preventive and protective measures within companies to either prevent workplace accidents or, at the very least, mitigate their impact on employees.

The highest incidence rate of occupational accidents, 22.8%, was recorded in

2013 and 2014, after which a downward trend has been observed since 2015. The establishment of an occupational health service and a functional Occupational Health and Safety Committee (OHSC) within the company, which facilitated the implementation of information and awareness campaigns among workers, may account for the reduction in occupational accidents observed over the years.

5.3. Injury Data

Direct impacts (32%) and falls (19.1%) constituted the primary circumstances under which accidents occurred, while manual handling (42.6%) and the work environment (20.6%) were identified as the leading causes of these incidents. These findings are consistent with those reported by Lenge N *et al.* in the Democratic Republic of Congo, N'Guessan *et al.* in Burkina Faso, and Bonsu *et al.* in South African platinum mines [24].

Trauma accounted for the predominant type of injury, representing 47.8% of cases. This proportion is comparable to that reported by Elenge *et al.* (50.5%) in a study on occupational accidents in artisanal mines in Haut Katanga [25], and is higher than the rates found by Lenge N and Wasungu *et al.*, who reported trauma incidences of 42.8% and 40.8%, respectively. This observation aligns with the principal circumstances and causes identified in our study.

The lower limbs (25.7%) and hands (21.3%) were the most frequently affected anatomical sites.

This finding is in agreement with those of Lenge N *et al.* in the DRC and N'Guessan *et al.* in Burkina Faso, who reported lower limb involvement rates of 25.88% and 26%, respectively.

In the present study, occupational accidents resulting in work stoppages affected 127 workers (92%), with a cumulative total of 1274 lost workdays. This figure is similar to that reported by Lende *et al.* (87.06%). The occurrence of work-stoppage injuries has been documented in several studies, including that of Elenge *et al.* [24] in Haut Katanga. The high frequency of work stoppages following occupational accidents reflects the severity of the injuries sustained, as aptly noted by Lenge N *et al.*

5.4. Prevention

The progressive decline in the occupational accident rate observed since 2015 in our study can be explained by the implementing effective institutional prevention mechanisms, such as the occupational health service and the Occupational Health and Safety Committee (OHSC). These structures have facilitated the regular organization of awareness and information campaigns concerning occupational hazards and recommended best practices. This finding corroborates the International Labour Organization's assertion that the most successful prevention programs are those that have effectively heightened employees' safety awareness [26]. However, it will be appropriate in a future study to carry out tests comparing the security measures before and after the implementation of institutional prevention

tools in order to fully attribute the decline in ATs to this intervention.

6. Conclusions

This study elucidates the epidemiological features of occupational accidents within an agri-food company in Libreville. The majority of workplace accidents involved experienced male workers from the labor force. The injuries, often severe, predominantly affected the extremities and resulted in extended periods of work absence.

The implementation of dedicated prevention structures has led to a substantial reduction in the incidence of occupational accidents over the years, thereby emphasizing the significance of a structured, multidisciplinary, and enterprise-specific prevention policy.

Enhancing worker training and informational sessions, in conjunction with the adoption of preventive measures tailored to the specificities of this industry, constitute key strategies for improving occupational health and safety.

Conflicts of Interest

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

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