

# Mortality of Traumatic Injuries in Traumatological Emergencies of the Yalgado Ouedraogo University Hospital Center in Ouagadougou (Burkina Faso)

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## Abstract

**Background:** Serious trauma is the main cause of death for people under 40 years old. According to the WHO, in 2002, nearly 1.2 million people died worldwide from road traffic injuries. The vast majority (90%) are from low and middle-income countries. The diagnostic performance, the quality of the treatments offered, and the optimization of trauma care channels, make it possible to improve the management of serious trauma. This is not always the case in our context of a country with limited resources. **Objectives:** The objective is to describe the epidemiological, diagnostic and therapeutic aspects of premortal death in patients with traumatic injuries. **Methods:** This was a descriptive study with retrospective collection in the trauma emergency department of Yalgado Ouedraogo Teaching Hospital (Ouagadougou, Burkina Faso). All patients who died on the ward while in the hospital or on arrival were included. **Results:** 192 deaths were listed. The annual mortality was 1.6%, the sex ratio was 6.1 and the average age was 36 years. Road traffic accidents were the main etiology: 163 deaths (85%). Head injuries were the most common injuries: 45.3% of deceased patients had a Glasgow score  $\leq 8$ . There was no pre-hospital care in 63% of the patients who died. The first six hours, on-call periods and the weekend were correlated with the death rate. **Discussion:** the high mortality in road traffic accident injuries in Africa is due to the weakness of pre-hospital care, the non-medicalization of the transport of the injured and also the non-wearing of helmets by motorcyclists. The MGAP (Mechanism, Glasgow coma scale, Age, arterial Pressure) score is reliable in predicting the mortality of serious injuries.

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## Keywords

Mortality, Traumatic Injuries, Emergencies, Accidents

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### 1. Introduction

Traumatic injuries are nowadays a real public health problem and represent a major cause of mortality and morbidity [1]. In developed countries, trauma is the third leading cause of death after cancer and cardiovascular disease [2]. In Africa, twenty-six (26) people die every hour from traumatic injuries in road traffic accidents [3]. Mortality linked to traumatic injuries at the Gabriel Touré University Hospital in Bamako in Mali was 2.5% [4] in 2012 and 2.9% in Yopougon in Côte d'Ivoire in 2015 [5]. In Burkina Faso, Ouédraogo S. found that road traffic was the leading cause of death from trauma (76.1%) [6]. According to the Yalgado Ouedraogo statistical yearbook in 2016, the mortality rate linked to traumatic injuries in trauma emergencies was 8.01%, thus constituting the 3rd cause of emergency death [7]. Few recent studies have looked at trauma emergency mortality in Burkina Faso [6]. The aim of this work is to audit the deaths due to traumatic injuries in the trauma emergencies of Yalgado Ouedraogo teaching hospital with the aim of improving care.

### 2. Materials and Methods

This was a retrospective descriptive study conducted in the trauma emergency department over a period of one year, from January 1 to December 31, 2020. All patients who died from traumatic injuries were included. Patients who died after being transferred to another department and those who died at the scene of the accident were not taken into account. The anonymity of the patients was respected. Data were collected from admission registers and trauma emergency medical records, and then analyzed on a computer using the EPI-INFO software in its 2018 version. The texts, figures and tables were processed by Word and Excel 2017 software. Chi-square was used as a statistical test for comparing variables and a significant 5% margin of error was considered. The variables studied were socio-demographic (age, sex, profession, residence, means of emergency evacuation), clinical and paraclinical (diagnosis, additional assessment), therapeutic (time and modalities of treatment) and progressive (duration of pre-mortem stay). The MGAP score (Mechanism, Glasgow coma scale, Age, arterial Pressure) [5] was used to assess the vital prognosis of patients. It is a pre-hospital prognostic score of trauma victims, which makes it possible to predict the prognosis [8]. It is simple and includes 4 items: Glasgow score, initial blood pressure, whether or not the trauma is penetrating, and age. According to the Glasgow score, depending on whether the systolic blood pressure is greater than 12 mmHg, between 6 and 12, or less than 6 mmHg, also depending on whether the trauma is penetrating or not, and finally according to the age greater or less

than 60 years old, the MGAP score is determined. It varies from 3 to 29 points and makes it possible to isolate 3 categories of patients: score 23 - 29: low risk group (2.8% mortality); score 18 - 22: intermediate risk group (15% mortality); score <18 points: high risk group (48% mortality). Built in 2010 from multivariate analysis, it has been validated. This prognostic score is efficient and in a 2011 literature review, it was recommended for its intrinsic qualities and its construction methodology [9].

### 3. Results

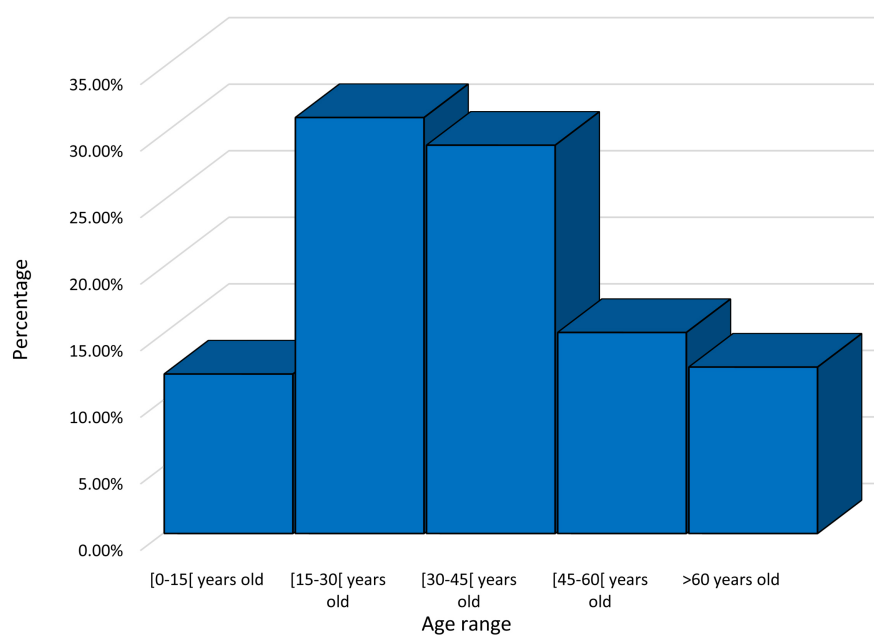
Hospital frequency, sex and age: 11,570 patients were admitted to trauma emergency during the study period and 192 deaths were notified, *i.e.* a mortality rate of 1.6%. There were 165 men (86%), a sex ratio of 6.1. The average age of the victims was 36 years (range 6 months and 85 years). The distribution by age group is shown in **Figure 1**.

Deaths were more numerous in March (12.5%) and more generally in the dry season (February to June), as shown in **Figure 2**.

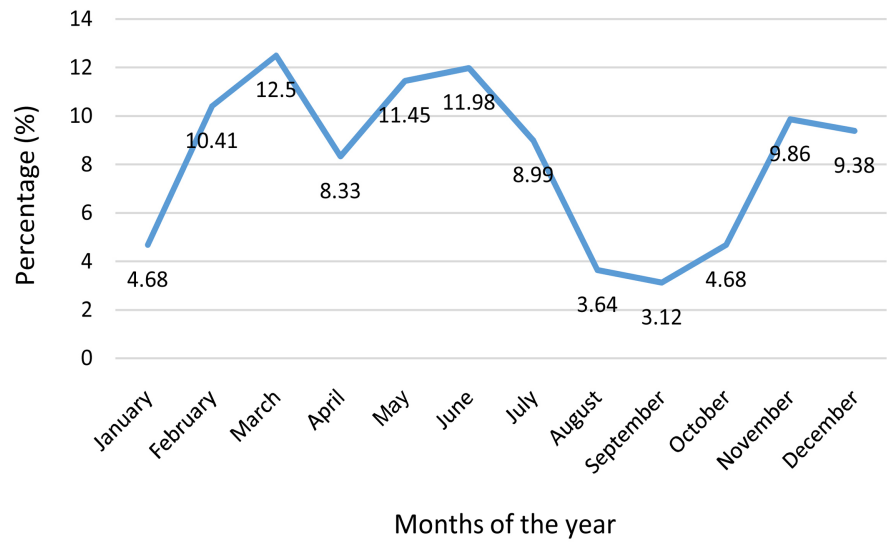
Origin, mode and time of admission: the victims came from the city of Ouagadougou in 67.2% of cases, less than 100 km in 18.8% and more than 100 km in 14%. They were brought to the emergency by firefighters in 54% of cases, by medical ambulance in 36% and by private vehicles in 8% of cases. Direct admissions were 167 and referrals from other health facilities 69. They mostly took place within one to three hours (**Table 1**).

Etiology: road traffic accidents were the leading cause of death in trauma emergencies, 85% (**Figure 3**).

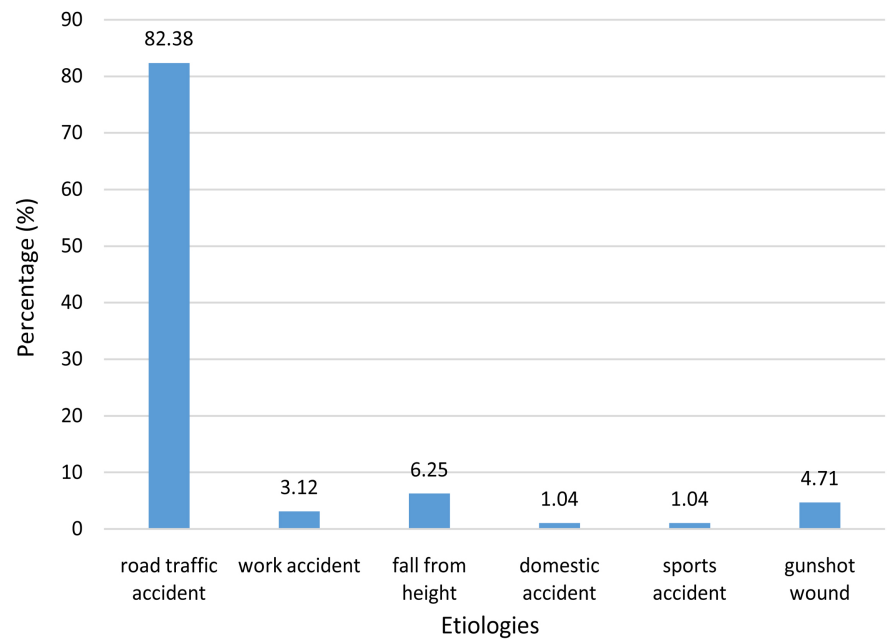
Clinical aspects: 45.3% of the deceased patients had a Glasgow score  $\leq 8$  (**Table 2**). Cranio-encephalic injuries, especially cerebral contusions were responsible



**Figure 1.** Distribution of death cases by age group.



**Figure 2.** Variations in mortality over the year.



**Figure 3.** Distribution of death cases by etiology.

**Table 1.** Distribution of death cases according to the admission period (n = 192).

Admission time	Effective (n = 192)	Frequency (%)
Less than 1 h	50	26.04
Between 1 h and 3 h	63	32.81
Between 3 h and 6 h	38	19.79
Between 6 h and 24 h	34	17.70
Greater than 24 h	7	3.64
Total	192	100

**Table 2.** Distribution of mortality according to the Glasgow score (n = 192).

Glasgow scale	Number (n = 192)	Percent (%)
≤8	87	45.31
9 - 12	57	29.69
≥13	36	18.75
Undetermined	12	6.25
Total	192	100

for 59% of deaths, followed by multiple trauma 26%, trauma to the spine 7%, and lesions to the pelvic limb, 6%. The distribution of mortality according to the anatomical region involved is reported in **Figure 4**.

Therapeutic aspects: in the pre-hospital setting, 71 patients (37%) had received treatment consisting of a venous route with infusion of fluids, dressing of wounds and prevention of tetanus by administration of serum and tetanus vaccine. Emergency treatment included, depending on the case, an infusion of fluids, administration of analgesics, antibiotics, oxygen therapy, orthopedic treatment and/or surgical treatment. Eighty-eight percent of deaths (88%) were recorded before the 24th hour. Forty-two (42) patients arrived dead, 11 within an hour and 15 within the first three hours (**Figure 5**). In addition, 92 deaths (48%) occurred during weekends and 80% during on-call. The mortality correlated with the MGAP score is reported in **Table 3**.

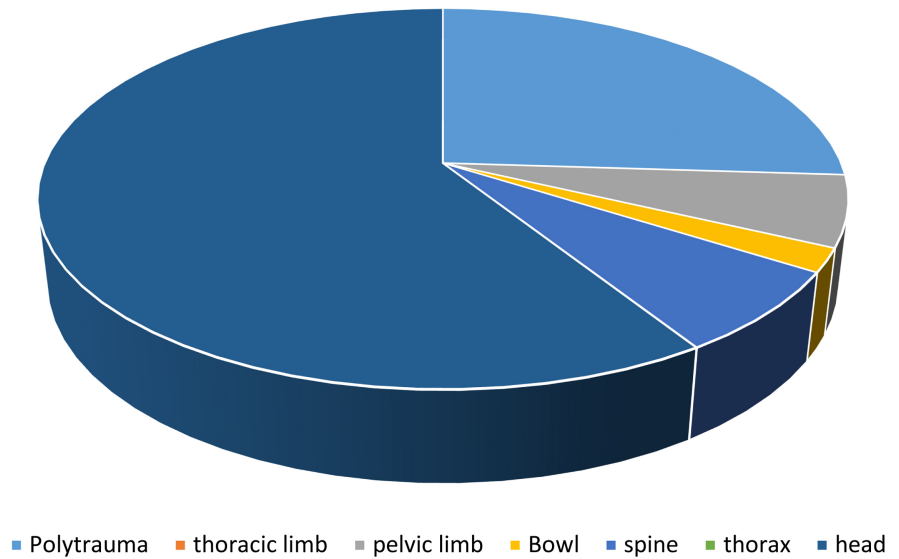
#### 4. Limits and Constraints of the Study

The retrospective nature was undoubtedly a limitation of our study. Indeed a certain number of files were not well informed. Ambulances and collection personnel were not medicalized, which undoubtedly worsened the condition of some participants during transport, thus increasing their MGAP score on arrival. Despite these limitations, the results we have reached can be the subject of a few comments.

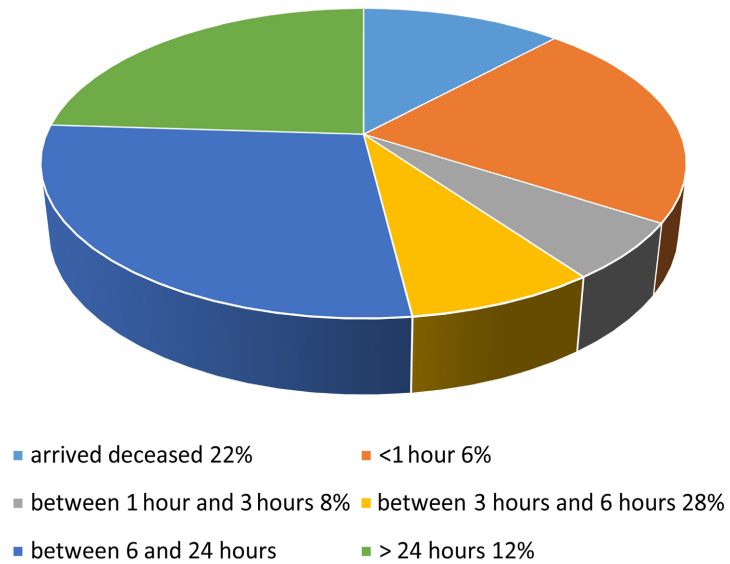
#### 5. Discussion

The death rate in trauma emergencies was 1.6%, but did not take into account deaths at the scene of the accident, patients discharged against medical advice and died afterwards, and deaths from abdominal injuries and/or thoracic (because taken care of in other specialized structures). Diemer in Bangui noted a rate of 8% [10] and Koné in Mali, 4% [4]. The Regional Hospitalization Agency for the Hauts-de-France region reported 1.02% at the Nîmes University Hospital and 1.4% at the Amiens University Hospital [11]. The high rates in Africa are partly due to the weakness of pre-hospital care and resuscitation.

In 72.4% of cases, the deceased patients were under 45 years old and the 15 - 30 age group was the most affected (31.3%) with a strong male predominance (sex ratio 6.1). It is indeed the most active layer and the most involved in road



**Figure 4.** Distribution of deaths according to the anatomical region involved.



**Figure 5.** Distribution of deceased patients according to time to death.

**Table 3.** Distribution of deaths according to the MGAP score (n = 192).

MGAP score	Number (n = 192)	Frequency (%)
23 - 29	12	6.25
18 - 22	59	30.73
<18	121	63.20

traffic accidents. Young age and male sex have been observed in other African studies [4] [6] [10] [12], but also Western such as that of Winston FK and Rineer C in Germany [13].

The months of March, April, May and June were the months that recorded

the most deaths, at 46.9%. They correspond to periods of strong heat and therefore great mobility of young populations in search of leisure and refreshment.

The majority of patients (54%) were brought in by firefighters who are the only means of evacuating the injured in our context. Their equipment is basic, reduced to a stretcher, a few boards and splints, and a shell mattress in poor condition. There is no care during the transfer, which increases the risk of death from seriously injured people. However, pre-hospital medicalization allows a 30% reduction in mortality for serious trauma patients [14]. Better still, the use of helicopters (Helicopter Emergency Medical Service: HEMS) increases the survival of severe trauma patients by 15% in Europe and North America [14]. Only 1/3 of the patients had been admitted before the 3rd hour. A previous study had already found the same delay for 34% of patients [6]. This average time is the same whether they are patients from the city of Ouagadougou brought in by firefighters or patients evacuated from more distant localities by ambulances. In fact, there is no statically significant link between the time to admission and the source ( $X = 16$ ;  $dof = 12$ ;  $p = 0.09$ ). The delay in admitting the wounded from Ouagadougou appears to be due to the wait time for firefighters, which is often very long due to an insufficient number of ambulances (only eight in all) and very congested urban traffic.

In 85% of cases, deaths from trauma in emergency rooms were due to road traffic accidents. Other authors have already made the same observation: Koné [4], Ouédraogo [6], and Da [15] with 59.6%, 83%, and 78.8% of cases. The high number of operators of two-wheeled vehicles and the lack of helmet use largely explain this state of affairs.

The state of consciousness influences the mortality of road traffic injuries. Indeed, almost half of the deceased patients had a Glasgow score of less than 8 (45.3%). This result is similar to those of Youssouf [16] and Diané [17] who found rates of 42% and 49% respectively. It testifies to the violence of the shock carried on the skull sometimes causing an intracranial expansive process or damage to the cervical cord.

The most affected anatomical region was the head (59.4%). These were mainly contusions and cerebral edema, explained by the failure to wear a helmet. Indeed, out of 22,000 motorcycles identified in 2018 in Ouagadougou and Bobo Dioulasso, only 4.6% of users wore helmets. And among them, 65% wore it badly [18]. The second cause of death from trauma was polyfractures with 48.9% of cases.

From a therapeutic standpoint, 63% of patients had not received treatment before arriving at the emergency room. This was already the case almost two decades ago since Sawadogo reported in 2003 a rate of 67.3% [19]. The reason is that firefighter's ambulances are not medicalized, unlike countries like France where in 96% of cases, transport and first aid to trauma patients is provided by equipped ambulances [11].

An MGAP score of less than 18 was correlated with a risk of mortality of 63.2%. The MGAP score is therefore quite reliable for the prediction of the

emergency mortality of seriously injured people. Nearly half of the patients died 6 hours after being admitted to the emergency room. This rate remains lower than that found by Koné [4] which was 69.1%. The high number of early deaths is explained by the severity of the trauma, and especially by the lack of pre-hospital care.

Deaths occurred in 48.4% of cases during on-call (6 p.m-6 a.m.). Diemer [10] and Dianga [20] had found rates of, 55% and 58% of cases for the same period. The lack of close monitoring (intensive care), the shortage of staff and the excessive number of patients in the emergency rooms partly explain this situation.

Deaths occurred more on weekends (from Friday to Sunday) or 61.5% of cases. For Diemer in the Central African Republic, this rate was 50.2% [10]. This could be explained by greater mobility, especially of young people during the weekends, associated with ethylism. In Switzerland, 17% of trauma victims among men and 12% among women are attributable to alcohol [21].

## 6. Conclusion

Deaths linked to traumatic injuries are significant in our context. This mainly concerns young males during traffic accidents, and especially on weekends. Pre-hospital care for seriously injured patients remains insufficient. The delay in admission, the absence of an intensive care unit, the decline in the vigilance of nursing staff during on-call duty and the failing technical platform are factors that have contributed to the increase in the number of deaths in emergency rooms. The MGAP score appears to be a reliable tool in determining the risk of death for serious injuries.

## Conflicts of Interest

The authors declare that they have no competing interest.

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