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# The Epidemiology of Traffic Accidents in the Kaffrine Region of Senegal: A Retrospective Study between 2014 and 2020

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## Abstract

Introduction: Traffic accidents are a major public health problem in low- and middle-income countries, with particularly high morbidity and mortality rates in sub-Saharan Africa. In Senegal, the Kaffrine region is one of the areas most severely affected. This study aims to describe the epidemiological profile of traffic accidents in the Kaffrine region. Methods: This was a retrospective descriptive study of traffic accidents recorded in the Kaffrine region between 2014 and 2020. Data were collected from reports by firefighters and police officers, as well as from the region's health service records. Results: Men accounted for the majority of victims, particularly drivers aged 30 to 40. The analysis showed a gradual increase in the number of accidents, from 113 cases in 2014 to 201 cases in 2020. Seriously injured people accounted for 45% of victims, and the fatality rate reached 11%. A higher frequency of accidents was observed in the early afternoon and early evening. Conclusion: Traffic accidents in the Kaffrine region mainly affect men of working age, resulting in a significant health and socioeconomic burden. The high proportion of serious injuries and the observed fatality rate highlight the need to strengthen data collection and analysis in order to improve preventive measures.

## Keywords

Traffic, Accident, Evolution, Epidemiology

## 1. Introduction

Road safety is a major concern for all countries around the world, whether developed or developing, as road accidents are a significant economic, social, and public health problem. Several studies have shown the significant economic and social

costs associated with accidents worldwide, particularly in Africa and Senegal [1].

According to the WHO, every year approximately 1.19 million people lose their lives in road accidents, with 20 to 50 million injured, many of whom are left disabled as a result of their injuries [2].

In Africa, according to the SSATP report, the average estimated road traffic fatality rate is 19.6 per 100,000 inhabitants, with significant variations ranging from 6.6 per 100,000 to 37.4 per 100,000 [3].

There are many factors associated with road accidents found in the literature, including unsafe road infrastructure, inefficient road operation and management systems, dangerous vehicles, road user behavior, such as not wearing a motorcycle helmet or seat belt, inexperience and risky behavior of drivers, speeding, reckless driving, traffic violations, driving under the influence of alcohol and drugs, use of cell phones while driving, inadequate enforcement of traffic laws, and inadequate post-accident care [4] [5].

In Senegal, over the last three years, an annual average of more than 4000 traffic accidents has been recorded, resulting in approximately 700 deaths [6].

The Kaffrine region is located in central Senegal and is crossed by the national highway and other secondary roads. The region regularly experiences accidents resulting in a significant number of deaths and injuries.

The objective of this study is to describe the epidemiological profile of traffic accidents recorded in the Kaffrine region during the period 2014-2020.

## 2. Methods

### 2.1. Study Framework

The Region of Kaffrine is centrally located and serves as a gateway to the subregion ("inter-state corridor"). It covers an area of 11,262 km$^2$, or 5% of the national territory. It comprises 4 departments, 9 districts, 37 local authorities, 4 departmental councils, and 33 municipalities. In 2024, the region's population is estimated at 878,045 inhabitants, including 445,345 men and 432,610 women.

Type of study: This is a retrospective descriptive study of road accidents that occurred in the Kaffrine region during the period 2014-2020.

Populations: The study population consisted of drivers, accident victims, and vehicles.

### 2.2. Sample

All individuals and vehicles involved in traffic accidents during the study period were systematically included in the analysis.

Data collection: Data were collected using questionnaires. The sources of the data collected were reports from firefighters, police officers, and regional health service records.

### 2.3. Data Collection

Data were collected using a grid. This grid enabled information to be collected

from the fire department, gendarmerie brigades, and hospital emergency departments and healthcare facilities.

### 2.4. Data Analysis

The data collected and processed in Excel were analyzed using Epi Info version 7. Descriptive analysis was used to determine frequencies, percentages, and averages.

### 2.5. Operational Definition of Terms

- Uninjured

Any person involved in a transport accident who has no clinically identifiable bodily injury and does not require medical attention or hospitalisation within 24 hours of the accident.

- Minor injuries

Any person involved in a transport accident who has sustained superficial injuries that are not life-threatening and do not require hospitalization for more than 24 hours.

- Serious injuries

Any person involved in a transport accident who has sustained one or more severe injuries affecting their functional and/or vital prognosis and requiring hospitalization for more than 24 hours, intensive care, or surgery.

- Fatalities

Any person who died at the scene of the accident or in the days following the accident as a direct result of injuries caused by the transport accident.

### 2.6. Ethical Considerations

No authorization from an ethics committee was required, as the study was based on a retrospective analysis of fully anonymized secondary data, ensuring the confidentiality of individual information.

## 3. Results

- **General description**

Between 2014 and 2020, we recorded 1082 traffic accidents in the Kaffrine region, with 2421 injuries, including 385 deaths (16% lethality).

- **Socio-demographic data**

The drivers involved in accidents were mainly male (99%). Drivers aged between 30 and 40 were more likely to be involved in accidents (39%) (**Table 1**).

The average age of victims was 26, with the minimum age being 2 and the maximum age being 62. The male-to-female ratio of victims was 6:1.

- **Characteristics of vehicles involved in accidents**

Motorcycles were most frequently involved in road accidents in the Kaffrine region, accounting for 45% of cases, followed by goods and passenger transport vehicles (36%) and private vehicles (19%).

Furthermore, in 68% of accidents, the vehicle involved was more than 10 years old.

**Table 1.** Distribution of age and gender of drivers involved in accidents.

| Age/Sex | Male | Female | Total | Percentage |
|---|---|---|---|---|
| 0 - 10 years | 0 | 0 | 0 | 0% |
| 10 - 20 years | 73 | 0 | 73 | 7% |
| 20 - 30 years | 301 | 0 | 301 | 28% |
| 30 - 40 years | 412 | 5 | 417 | 39% |
| 40 - 50 years | 238 | 0 | 238 | 22% |
| 50 - 60 years | 41 | 0 | 41 | 4% |
| >60 years | 12 | 0 | 12 | 1% |
| Total | 1077 | 5 | 1082 | 100% |
| Percentage | 99.5% | 0.5% | 100% | 100% |

- **Trends in the number of accidents**

The data analyzed show a significant increase in the number of accidents, from 113 cases in 2014 to 201 cases in 2020. A similar trend was observed for injuries, with an overall increase during the period studied and a peak of 521 injuries recorded in 2017. In terms of mortality, the number of accident-related deaths also followed an upward trend, reaching a maximum of 64 deaths in 2019 (Figure 1).

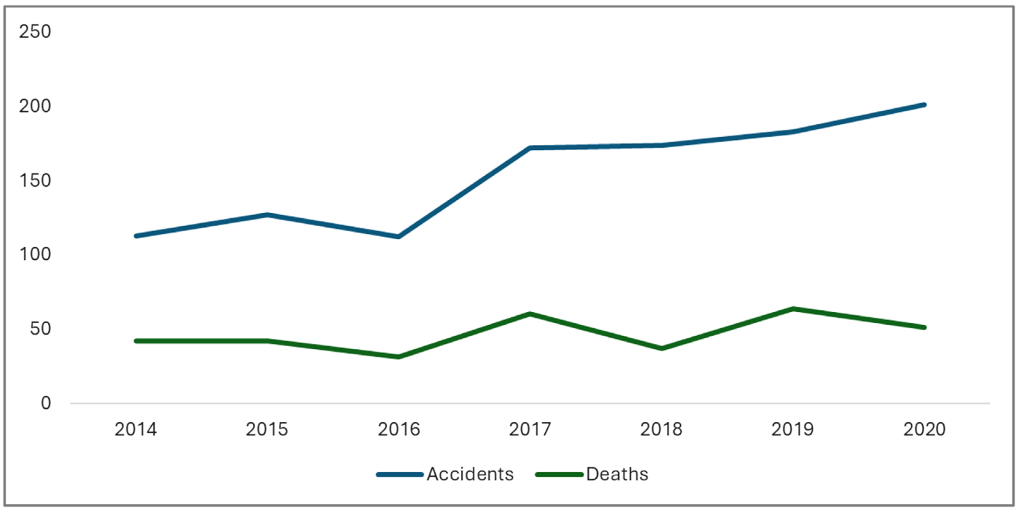


**Figure 1.** Evolution of accidents and fatalities between 2014 and 2020.

- **Distribution of traffic accidents by type of victim, 2014 to 2018**

Analysis of traffic accidents shows a predominance of serious injuries, which accounted for nearly half of all victims (45%). Minor injuries (16%) and fatalities (11%) also accounted for significant proportions. However, just over a quarter of those involved (28%) were uninjured (Figure 2).

- **Distribution of road accidents according to the time of occurrence**

Road accidents occur more frequently between 1 p.m. and 2 p.m. and between 7 p.m. and 8 p.m., corresponding, respectively, to the early afternoon and early evening.

- **Distribution of accidents by location**

The vast majority of traffic accidents occurred outside built-up areas, accounting for 56% of cases, compared with 44% occurring in built-up areas.

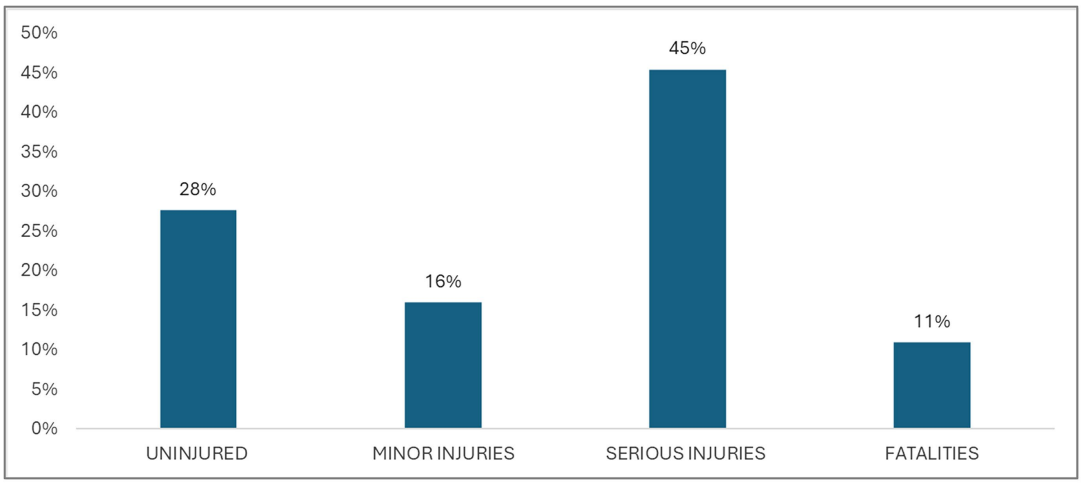


**Figure 2.** Distribution of traffic accidents by type of victim, 2014 to 2018.

## 4. Discussion

Analysis of accidents from an epidemiological perspective in the Kaffrine region has shown that a significant proportion of accident victims are male. These results are comparable to those found in the literature, particularly in countries in the West African subregion. Studies in Mali and Niger have shown that 81% and 93.6% of accident victims are male, respectively [7] [8].

The study also revealed that male drivers were 99% more likely to be involved in accidents. The same finding was made in the Democratic Republic of Congo, where men accounted for 84.8% of drivers responsible for accidents [9].

In our series, the age group of drivers involved in accidents was between 30 and 40 years old. In their work, Kandolo *et al.* found a similar result, with 39% of accidents involving drivers aged between 28 and 37 [9].

The majority of those involved are men aged 30 to 40, corresponding to the economically active population. Their high exposure could be linked to socio-economic activities and increased daily mobility. Accidents affecting this age group lead to a loss of productivity, a decrease in household income, and increased economic insecurity [1].

In our series, a gradual increase in the number of accidents, injuries, and deaths was observed between 2014 and 2020. This upward trend is consistent with data reported in the literature, which indicate that over the past two decades, road accidents have been accompanied by a significant increase in mortality and associated injuries [3] [10].

According to our study, seriously injured individuals accounted for 45% of traffic accident victims, while the fatality rate reached 11%. In comparison, a study conducted in the Democratic Republic of Congo reported a higher proportion of

serious injuries (66.2%), but a lower fatality rate (5.7%) among road accident victims [11]. Similarly, in Chad, Kali *et al*. observed a comparable proportion of serious injuries (46.5%), associated with a lower fatality rate (4.1%) [12]. The differences observed between countries can be explained by variations in the initial severity of injuries, accessibility to specialized care facilities, availability of emergency services, and methods of data collection and classification. These findings highlight the need to strengthen trauma care systems and prehospital emergency response mechanisms in order to reduce traffic accident fatalities.

In this study, a higher frequency of traffic accidents was observed in the early afternoon (1 p.m. - 2 p.m.) and early evening (7 p.m. - 8 p.m.). Similar results were reported by Diango *et al*., who showed that the majority of accidents occurred between 7:30 a.m. and 4 p.m. [7].

However, Blaise's work highlighted a different temporal distribution, with the period most prone to accidents on the roads of Cameroon's western corridor occurring between 6 p.m. and 6 a.m. [13]. These differences in the time of day when accidents occur could be explained by the quality of public lighting, the condition of infrastructure, nighttime driving habits, and the prevalence of risky behaviors such as speeding or driving under the influence of psychoactive substances. These variations highlight the importance of adapting road safety strategies to local specificities and the temporal profiles of accidents.

## 5. Conclusion

This study highlights the high and growing burden of traffic accidents in the Kaffrine region, characterized by a gradual increase in the number of accidents, injuries, and deaths. In light of these findings, several priority actions should be implemented to reduce traffic accident-related morbidity and mortality, including improving pre-hospital care capacity by training first responders, strengthening medical evacuation resources and reducing response times, as well as strengthening systems for collecting, analyzing, and monitoring traffic accident data in order to guide public policy and evaluate the impact of the interventions implemented.

## Limitations of the Study

The limitations of this study include the lack of harmonisation of data registers and the incompleteness of certain information, which may have affected the comprehensiveness and accuracy of the accident analysis.

## Conflicts of Interest

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

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