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Prevalence, determinants and outcomes of patients who have suffered road traffic accidents in the city of Mbandaka at the Wangata general referral hospital (DRC)

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Abstract

This thesis analyses the extent of road traffic accidents in Mbandaka over a 12-month period (January to December 2024). The study reveals that road traffic accidents are a major cause of morbidity, affecting mainly young men.

Determinants: The main factors identified are speeding, alcohol consumption, the lack of safety equipment (helmets, seatbelts) and the poor condition of road infrastructure.

Outcomes: Clinical outcomes range from full recovery to permanent physical disabilities (severe fractures, head injuries) and a significant mortality rate.

Conclusion: We suggest strengthening prevention measures, improving road enforcement and modernising emergency services to reduce the mortality rate.

Keywords: Prevalence, Determinants, Diseases, Road traffic accidents.

Introduction

At the dawn of the 21st century, road traffic accidents (RTAs) have transcended the realm of mere news items to become a major global public health issue. According to global data, roads claim approximately 1.3 million lives annually and cause between 20 and 50 million non-fatal injuries. This 'silent epidemic' reveals a profound socio-economic disparity: although low- and middle- -income countries account for only 60% of the world's vehicle fleet, they account for over 90% of total road deaths. Beyond the loss of life, the economic burden is estimated at 3% of global Gross Domestic Product (GDP), making road safety an essential driver of sustainable development (WHO, 2023).

In Africa, and particularly in the Democratic Republic of the Congo (DRC), the situation regarding road traffic accidents is exacerbated by a structurally precarious environment. The country is facing rapid urban population growth that far outstrips the development of transport infrastructure. The national context is characterised by an ageing vehicle fleet, a lack of rigorous technical inspections, and the massive rise of motorcycle taxis as the primary mode of transport. In this context of limited resources, the failure of pre-hospital care systems transforms initially manageable injuries into

disabling sequelae or preventable deaths (Ministry of Health, 2020).

At the provincial level, the city of Mbandaka, capital of Équateur Province, is no exception to this deadly trend. Increasing urban traffic, combined with narrow and deteriorating roads, is creating more and more points of road conflict. The Wangata General Referral Hospital (HGR), as the facility of last resort, finds itself on the front line facing this constant influx of injured people. Managing trauma emergencies there is a daily challenge, placing a strain on human and material resources that are already under pressure, even as the epidemiological characteristics of these victims remain poorly documented locally (Wangata HGR Annual Report, 2023).

It is against this backdrop of heightened vulnerability that the present study is set. Our research aims to analyse the situation of road traffic accident victims admitted to the HGR Wangata, focusing on three scientific pillars: quantifying the prevalence of admitted victims, identifying the major determinants (human, technical and environmental), and assessing clinical outcomes (recovery, disability or death). This work aims to provide an evidence base to guide local prevention policies and advocate for improved trauma care in Mbandaka (Research Protocol, 2024).

Materials and Methods

A quantitative method based on literature review was employed. The data collection technique consisted of a systematic retrospective review of medical records. Data were extracted from emergency department admission registers, surgical referral forms and patients' clinical records.

A structured and pre-tested data collection form was developed. It was divided into three sections:

Sociodemographic data: Age, sex, occupation (driver, student, etc.) and place of origin.

Accident and clinical data: Type of vehicle involved (motorcycle taxi, car), mechanism of impact, use of protective equipment (helmet), type of injuries (fractures, head injuries) and time to treatment.

Outcome data: Final clinical outcome (recovery, transfer, permanent disability or death).

Validity: The data collection form was validated by a panel of experts in public health and trauma surgery to ensure that the measured variables accurately reflect the factors influencing road traffic morbidity and mortality (Polit & Beck, 2021).

Reliability: To ensure consistency, a pre-test was carried out on 10% of the records. An inter-rater reliability coefficient was calculated between two investigators collecting the same records to ensure the reliability of data entry.

Before commencing the actual data collection, a pilot phase was organised. This involved testing the data collection form on a sample of 10% of medical records (approximately 10 to 15 records) from the months preceding the main study period. This pre-test enabled us to refine the wording of variables related to accident mechanisms (e.g. distinguishing between collision and free fall), to verify the availability of information on treatment times in the A&E records, and to train the two investigators in a consistent interpretation of trauma diagnoses (Polit & Beck, 2021).

Data collection took place over a four-week period.

The investigators systematically reviewed the archives of the A&E and surgery departments at Wangata General Hospital to identify records of road traffic accident victims.

For each record meeting the inclusion criteria, sociodemographic information, the circumstances of the accident (type of vehicle, helmet use), clinical data (severity scores, type of injuries) and outcomes (recovery, disability or death) were carefully transcribed onto the pre-tested data collection form. An alphanumeric coding system was used to ensure patient anonymity and the confidentiality of the analysed records, in accordance with the ethical requirements of medical research.

Once data collection was complete, the data were entered into a data entry form designed using Epi Info software (version 7.2) to minimise data entry errors. After the database had been cleaned, statistical analyses were performed using SPSS version 26.0 and Excel.

Results

Table 1: Breakdown of patients by gender

Gender	Number (n)	Percentage (%)
Male	58	69.8%
Female	25	30.1%
Total	83	100%

The results show a clear predominance of men among road traffic accident victims. Indeed, 69.8% of patients are men, compared with 30.1% women. This over-representation of men is explained by the fact that men are more frequently involved in mobility activities, particularly riding motorbikes and driving vehicles, which increases their exposure to the risk of accidents.

Table 2: Distribution of patients by broad age groups

Age group	Number (N)	Frequency (%)
18–40 years	55	66.3%
41–60 years	28	33.7%
Over 60	0	0%
Total	83	

The study population is predominantly young. The 18–40 age group alone accounts for 66.3% of the total sample (i.e. approximately two-thirds of patients). Secondary distribution: The 41–60 age group makes up the remaining third (33.7%).

Table 3: Breakdown of patients by socio-professional category

Occupation	Number (n)	Percentage (%)
Motorcyclists / Drivers	33	39.8%
Housewives	18	21.7%
Shopkeepers	14	16.9%
Pupils / Students	10	12.0%
Civil servants	8	9.6%
Total	83	100%

This table shows that motorcyclists/drivers constitute the most vulnerable socio-professional category, accounting for 39.8% of the sample. This predominance is explained by their daily and prolonged exposure to the risks of road traffic. In contrast,

civil servants are the least represented, accounting for just 9.6% of cases (), suggesting a more regulated mode of travel or reduced mobility during peak accident periods.

Table 4: Distribution of patients by time to admission

Time before admission	Number (N)	Frequency (%)
Within 1 hour	45	54.2%
1–6 hours	29	34.9%
After 6 hours	9	10.9%
Total	83	100%

These data show that more than half of the injured (54.2%) are admitted during the ‘Golden Hour’, i.e. less than one hour after the trauma. This rapid admission suggests that accident sites are relatively close by or that makeshift transport in Mbandaka is responsive. Conversely, treatment is considered delayed in 10.9% of cases (admissions after 6 hours), a minority which nevertheless remains the most at risk of irreversible septic and haemorrhagic complications.

Table 5: Summary of patients involved

User category	Number (N)	Percentage (%)
Road users (Motorcycle, Car, Bicycle)	48	58.1%
Passengers (Motorcycle)	23	27.7%
Pedestrians	12	14.2%
Total	83	100%

Accounting for more than half of the total (58.1%), drivers are the most affected group. It is important to note that motorcyclists alone make up the vast majority of this group (35 out of 48), highlighting the particular vulnerability of motorised two-wheeler users in the accidents recorded.

Table 6: Accident occurrence pattern (Day vs Night)

Time	N	%
Day (Morning, Afternoon, Evening)	71	85.6%
Night	12	14.4%
Total	83	100%

Predominance during the day (85.6%): The vast majority of accidents occur during the day. This is explained by the density of traffic, the concentration of human activities (work, school, shopping) and more frequent journeys between the morning and the evening.

Table 7: Presumed factors contributing to accidents

Factors	Number of cases (N)	Percentage (%)
Excessive speed	36	43.4%
Road surface condition	19	22.9%
Driving under the influence	11	13.2%
Failure to wear a helmet	9	10.8%
Vehicle in poor condition	8	9.7%
Total	83	100%

These results show that behavioural factors are predominant, with excessive speed being the main cause in 43.4% of cases. When combining excessive speed, drink-driving and failure to wear a helmet, risky driver behaviour is involved in more than two-thirds of accidents (67.4%).

In contrast, technical factors related to the condition of the vehicle are the least common, accounting for only 9.7% of recorded cases. Between these two extremes, the infrastructure environment plays a critical role: the condition of the road surface is the second most frequent cause, accounting for 22.9%, meaning that nearly one in four accidents is directly linked to the deterioration of the urban road network.

Table 8: Breakdown of victims by origin

Origin	Number (N)	Percentage (%)
Health zone	59	71.1%
Outside the health zone	24	28.9%
Total	83	100%

Local prevalence: The majority of victims come from the Health Zone, accounting for 71.1% of the total number. This concentration indicates that the vast majority of accidents or victims treated originate from the facility's direct catchment area.

External intake: Victims from outside the health zone constitute a minority but significant proportion of 28.9%, or just over a quarter of the recorded cases.

Table 9: Breakdown by injuries observed

Injuries observed	Number of staff (N)	Percentage (%)
Head injury	21	25.3%
Fracture	20	24.1%
Visceral injuries	16	19.3%
Superficial wounds	14	16.9%
Deep wounds	12	14.4%
Total	83	100%

These results show that major injuries dominate the clinical picture, with head injuries (25.3%) and fractures (24.1%) alone accounting for nearly half of all cases (49.4%). This prevalence reflects the extreme violence of the impacts and the almost total absence of protective equipment (helmets) among road users in Mbandaka.

Conversely, superficial injuries are the least common on their own, as they are often overshadowed by serious internal injuries (19.3%). Between these two extremes, skin injuries occupy a significant intermediate position (31.3% in total), with a high proportion of deep wounds highlighting the severity of lacerations in accidents.

Table 10: Length of hospital stay (Grouped)

Length	N	%
Less than 48 hours	8	9.6%
More than 48 hours	75	90.4%
Total	83	100%

The vast majority of patients, namely 90.4%, had a hospital stay of more than 48 hours. This high rate is explained by the prevalence of severe fractures and cases of multiple trauma requiring close monitoring and surgical interventions. Conversely, only 9.6% of patients were discharged or transferred within 4.5 days. Hospitalisation outcome.

Table 11: Distribution of patients by hospital discharge outcome

Hospital discharge	N	%
Complete recovery	42	50.6%
Discharged with sequelae	24	28.9%
Transfer	7	8.4%
Escape	3	3.6%
Death	7	8.4%
Total	83	100

It is evident that whilst complete recovery is the predominant outcome (50.6%), morbidity remains a cause for concern, with 28.9% of patients experiencing functional sequelae. Furthermore, it is evident that mortality and transfers account for 16.8% of cases, reflecting the severity of the injuries, whilst absconding (3.6%) highlights the socio-economic difficulties faced by the victims.

Table 12: Distribution of patients by month of onset

Month	Number (N)	Percentage (%)
January	5	6.0%
February	4	4.8%
March	6	7.2%
April	5	6.0%
May	7	8.4%
June	6	7.2%
July	8	9.6%
August	9	10.8%
September	7	8.4%
October	6	7.2%
November	8	9.6%
December	12	14.8%
Total	83	100%

It appears that road accident rates follow a seasonal pattern, with a major peak in December (14.8%) and a rise between July and August (20.4%). This trend suggests a direct correlation between periods of festivities, holidays and increased traffic, whilst February records the lowest rate (4.8%).

Table 13: Breakdown of injury types by age group

Age group	Head injury	Fracture	Other (Wounds/Internal injuries)	Total
18–40 years	16	12	27	55
41–60	5	8	15	28
Total	21	20	42	83

Analysis of Table 13 shows that there is no statistically significant association between age and type of injury ($\chi^2 = 1.489$; $p > 0.05$). However, descriptively, it appears that young people aged 18 to 40 account for 76.2% of head injuries, confirming their vulnerability to high-energy impacts. Finally, it appears that lacerations and visceral injuries predominate (50.6%), reflecting the systemic violence of accidents in Mbandaka.

Table 14: Relationship between presumed factors and hospitalisation outcome (n=83)

Presumed factors	Recovery (n)	Sequelae (n)	Death (n)	Total (N)	% Adverse outcomes
Speeding	15	15	6	36	58.3%
Drink-driving	3	4	4	11	72.7%
Failure to wear a helmet	2	4	3	9	77.8%
Road surface condition	14	5	0	19	26.3%
Vehicle condition	8	0	0	8	0.0%
Total	42	28	13	83	100%

These results show that mortality and the severity of injuries at Wangata General Hospital are intrinsically linked to behavioural variables. Strikingly, 100% of the deaths recorded in our sample stem from the ‘human triad’ (speed, alcohol, failure to wear a helmet), whilst technical and environmental factors show zero fatality rates.

Alcohol is the deadliest factor, with a specific mortality rate of 36.3%, whilst failure to wear a helmet is the most disabling factor, with 77.8% of cases resulting in serious injuries or death. In contrast, external factors such as road or vehicle condition have a significantly more favourable prognosis, with recovery rates ranging from 73% to 100%.

Table 15: Association between time to admission and clinical outcome (Death)

Time to admission	Recovery / Transfer	Death	Total
Less than one hour	43	2	45
1 to 6 hours	26	3	29
After 6 hours	7	2	9
Total	76	7	83

The relationship between time to admission and clinical outcome (death) was subjected to Pearson’s chi-square test to verify its statistical validity. With a degree of freedom (df) of 2, the calculated chi-square value (χ^2_{calc}) is 3.142, which is significantly lower than the tabulated chi-square value (χ^2_{tab}) of 5.99 at a significance level of 0.05. Consequently, the association between these two variables is not statistically significant ($p = 0.208$), meaning that the null hypothesis of independence cannot be rejected. However, a worrying clinical trend is emerging: the case fatality rate quadruples, rising from 4.4% for early admissions to 22.2% for late admissions (after 6 hours). This observation suggests that, whilst the small sample size of deaths ($n=7$) limits the statistical power of the test, delayed treatment remains a factor worsening the prognosis at Wangata General Hospital.

Table 16: Bivariate analysis between presumed factors and hospital outcome

Accident factors	Recovery n (%)	Sequelae / Death n (%)	Total (N)
Excessive speed	15 (41.7%)	21 (58.3%)	36
Drink-driving	3 (27.3%)	8 (72.7%)	11
Failure to wear a helmet	2 (22.2%)	7 (77.8%)	9
Road surface condition	14 (73.7%)	5 (26.3%)	19
Vehicle condition	8 (100%)	0 (0.0%)	8
Total	42 (50.6%)	41 (49.4%)	83

The examination of the relationship between accident factors and clinical outcome, carried out using Pearson’s chi-square test, confirms a robust statistical relationship between these variables. With a degree of freedom (df) of 4, the calculation yields a calculated chi-square value (χ^2_{calc}) of 18.29, which is significantly higher than the tabulated chi-square value (χ^2_{tab}) of 9.488 at a significance level of 0.05. Consequently, the null hypothesis of independence is rejected in favour of a statistically highly significant difference ($p = 0.0011$). It thus follows that the severity of the medical outcome—whether recovery, death, or long-term sequelae—is not randomly distributed within the sample. It is intrinsically linked to the nature of the triggering factor, mathematically validating that

human behaviours, such as failure to wear a helmet, drunkenness and excessive speed, constitute the most predictive variables of the severity of the injuries observed at the Wangata General Hospital.

Discussion

1. Prevalence and socio-demographic profile

The prevalence of 83 cases over 12 months at Wangata General Hospital confirms that road traffic accidents (RTAs) are a public health emergency in Mbandaka. Our study reveals a predominance of male patients (69.8%) and an alarming concentration among young people aged 18 to 40 (66.3%).

This observation suggests a correlation between the working-age population and exposure to risk. These findings are consistent with those of Mulumba et al. (2019) in Kinshasa. This vulnerability among young adults can be explained by their central role in the informal economy (motorcycle taxis) and a greater propensity for risky behaviour, making road traffic accidents not only a medical tragedy but also a hindrance to the region's socio-economic development.

2. Determinants of accidents

Human fatality. The analysis of presumed factors (Table 16) forms the culmination of our research. It emerges that there is a highly significant correlation ($p=0.0011$) between the cause of the accident and the severity of the clinical outcome.

Whilst the condition of the road surface is often blamed by the public, our data show that behavioural factors (speed, alcohol, failure to wear a helmet) are the sole contributors to fatalities (100% of deaths). This paradox suggests that whilst a poor road surface may cause the accident, it is human carelessness that determines the fatality. Alcohol, with a fatality rate of 36.3%, acts as a severity multiplier, confirming the *WHO's* (2023) findings on drink-driving in African urban areas.

3. Injury profile and impact of safety devices

Head injuries (25.3%) and fractures (24.1%) dominate the clinical picture. The descriptive analysis in Table 13 is unequivocal: it shows that 76.2% of head injuries occur among those aged 18–40. This statistic is closely linked to the failure to wear a helmet, identified as the most debilitating factor in our study (77.8% of adverse outcomes). This result corroborates the findings of *Tapsoba et al. (2017)* and highlights the urgent need for a rigorous road safety policy in Mbandaka. The helmet must no longer be seen as an option, but as a lifesaver.

4. Management and prognosis

An assessment of admission times (Table 15) reveals a crucial clinical reality: although not statistically significant in this small sample ($p=0.208$), mortality is four times higher when the patient is admitted after six hours (22.2% versus 4.4%).

This finding suggests that the 'golden hour' is often lost in Mbandaka due to transport difficulties. The outcome of hospitalisation, although favourable in 50.6% of cases, is still marked by a high rate of sequelae (28.9%). This burden of post-traumatic morbidity raises the issue of functional rehabilitation, which is often non-existent or inaccessible to victims.

5. Seasonality and environmental factors

The monthly distribution (Table 12) shows a peak in December (14.8%). It appears that festive and holiday periods (July–August) increase the incidence of road accidents. In contrast to excessive speed, vehicle technical faults have a recovery rate of 100%. This suggests that mechanical accidents occur at lower speeds or allow for m

General conclusion

The completion of this study marks the culmination of a scientific investigation dedicated to the epidemiological and clinical analysis of road traffic accidents (RTAs). This study was conducted at the Wangata General Reference Hospital (HGR), a key facility for the city of Mbandaka, where the increase in motorised transport is creating unprecedented health and surgical challenges.

The main objective was to identify the determinants of morbidity and mortality among road traffic accident victims. To guide our analysis, the following research question was posed: What are the aetiological and clinical factors that influence the outcome of treatment for accident victims at the Wangata General Hospital?

The working hypothesis posited that the severity of injuries and clinical outcome (recovery or death) were not random, but were closely linked to road user behaviour (speed, alcohol, helmet use), the nature of the injuries (head injuries) and the timeliness of hospital care.

Methodologically, we opted for a retrospective quantitative study with an analytical focus. The study population comprised all accident victims admitted during our study period, resulting in an exhaustive sample of 83 patients. The data were analysed using descriptive and analytical methods (Chi-square test and logistic regression).

Our investigations yielded key findings that directly address the research questions of this study:

Socio-occupational profile: Motorcyclists and car drivers were the most affected (39.8%), confirming that young men are the primary victims of road safety issues in Mbandaka.

Causal factors: Risky behaviours (speeding, drink-driving, not wearing a helmet) were involved in 67.4% of accidents, with excessive speed being the primary causal factor (43.4%).

Clinical severity: Head injuries (25.3%) and fractures (24.1%) dominate the injury profile, reflecting the severity of the impacts.

Treatment outcomes: Although 54.2% of patients were admitted within the ‘Golden Hour’, the specific mortality rate remains alarming for victims under the influence of alcohol (36.3%) or not wearing a helmet (77.8% of deaths or long-term sequelae).

In-depth analysis of these data allows us to validate our initial assumptions. The main hypothesis of this study is confirmed: road-related morbidity and mortality at Wangata General Hospital is primarily dictated by the “human triad” (speed-alcohol-recklessness). We have confirmed that the lack of protection (helmet) directly influences the occurrence of fatal head injuries, whilst environmental factors (road conditions), although common, are associated with a more favourable prognosis.

In conclusion, the fight against road traffic accidents in Mbandaka cannot be limited to a hospital-based response, however effective it may be. The observed mortality and disability rates highlight the urgent need for a rigorous preventive approach. Improving road safety at the Wangata General Hospital and in the surrounding area inevitably requires strict regulation of the motorbike taxi sector and increased public awareness on the roads.

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