

Impact of Road Infrastructure on User Safety in Cameroon: Analysis and Recommendations

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Abstract: This study investigates the impact of road infrastructure on user safety in Cameroon's Littoral region, where road accidents represent a significant public health issue. The Littoral region recorded 14,852 road accidents, while Cameroon as a whole reported 72,933 accidents between 2016 and 2022. Employing a mixed-methods approach that integrates documentary review, case studies, and accident report analysis, the research identifies three primary deficiencies undermining road safety: substandard road quality, insufficient signage, and inadequate maintenance policies. The findings indicate a direct correlation between these infrastructure deficiencies and the frequency of accidents. Through comparison with more effective international models, the study identifies specific areas for improvement. The conclusion underscores the urgent need for a threefold commitment: substantial investment in modernizing critical infrastructure, the implementation of binding policy reforms to ensure sustainable construction and maintenance standards, and enhanced support for stakeholders, including local authorities, the private sector, and civil society. These measures are essential to reverse the current trend in accidents and improve travel safety in Cameroon.

Keywords: Road safety, infrastructure, Cameroon, accidents, public policy, littoral region.

1. Introduction

Road transport plays an essential role in Cameroon's economy, facilitating not only the movement of goods and services but also the mobility of people. It is the only means of travel connecting the entire country, as railways and domestic flights are absent in certain regions of Cameroon. It covers almost 90% of domestic passenger transport demand and around 75% of freight demand (TRANSTAT, 2015). In recent years, population growth and the resulting need for mobility have led to a considerable increase in the number of vehicles and motorcycle taxis, as well as the proliferation of transport agencies and delivery companies in Cameroonian cities. A road accident is an unintentional collision on the road network between a car, truck, motorcycle or bicycle and any other vehicle, person or animal, whether moving or not, resulting in at least material damage (destruction of public infrastructure, car involved), bodily injury (injuries), trauma (psychological) or the death of one or more persons involved (Bauer, al 2014). As one of the problems undermining society on a global scale, traffic accidents are the eighth leading cause of death worldwide (WHO 2022). According to statistics from the World Health Organization (2023), approximately 1.19 million deaths are recorded worldwide each year due to road accidents, or more than 3,000 people per day. In addition, between 20 and 50 million people are injured, many of whom remain disabled as a result of their injuries. Most (90%) of these accidents occur in low- and middle-income countries (WHO 2023). This is precisely the case in Cameroon, with an average of 30.2 deaths per 100,000 inhabitants (World Bank 2019). Cameroon recorded 11,803 accidents in 2016, 10,872 in 2017, 8,150 in 2018, 9,391 in 2019, 8,980 in 2020, 10,002 in 2021, and 13,735 in 2022 (TRANSTAT 2023). Regarding the economic losses suffered by Cameroon, a 2009 study conducted as part of the development of the National Road Safety and Prevention Strategy estimated that road accidents cost nearly 100 billion CFA francs per year, or about 1% of

GDP at the time. A recent WHO study (2023) estimated this figure at 3% of GDP in low-income countries. Three main factors influence the occurrence of road accidents: the means of transport, the road environment, and human factors (Elefteriadou, 2016). Human factors such as speeding and distraction are considered to be the main causes of road accidents (S. Chaoui, 2019, p. 131), regardless of the environment and vehicles. To say that excessive speed and distracted driving are the main causes of road accidents is not always true in developing countries, where road infrastructure is poorly maintained and, in some cases, nonexistent. Given this context, a central question emerges: how do road infrastructure conditions influence the safety of motorists, pedestrians, and cyclists? A comprehensive analysis of infrastructure can elucidate the factors contributing to road accidents and inform the development of effective safety measures. The objectives of this research are to assess the risks associated with road infrastructure, such as degradation and design flaws, by identifying critical elements affecting user safety, and to propose actionable solutions aimed at reducing accidents and enhancing road safety in Cameroon. The study focuses on national, regional, and rural roads in the coastal region from 2016 to 2023, providing a detailed analysis of infrastructure developments and their impact on road user safety. This targeted approach enables the formulation of interventions and recommendations tailored to the realities of travel in Cameroon.

2. Literature Review

Road safety is a major public health issue worldwide, and numerous studies show a direct link between road design and user safety. According to the Global Status Report on Road Safety published by the World Health Organization (WHO 2023), well-designed roads can significantly reduce accidents and casualties. This report highlights the importance of adapting infrastructure to the needs of different users, including motorists, cyclists, and pedestrians. For example,

features such as clearly marked pedestrian crossings, separate cycle lanes, and adequate signage are essential to protect the most vulnerable users. International studies also highlight the importance of road safety audits and technical assessments to identify black spots and improve road design (World Bank, 2020).

Globally, the relationship between road design and road safety has been extensively studied, with numerous studies demonstrating the significant impact of road infrastructure on accident rates and severity (Terrones-Saeta et al., 2020). Road geometry, including curvature, lane width, sight distance, and intersection design, plays a critical role in determining the likelihood of collisions and the severity of injuries (Sahaf et al., 2021). For example, sharp bends with inadequate super elevation can increase the risk of vehicle loss of control, while narrow lanes can lead to side-impact collisions. Similarly, intersections with poor visibility or inadequate traffic control measures may be vulnerable to accidents, particularly those involving vulnerable road users such as pedestrians and cyclists (Wang et al., 2021). Appropriate road design, incorporating safety features such as wider lanes, gentler curves, adequate sight distance, and well-designed intersections, can significantly reduce the risk of accidents and improve overall road safety. Traffic safety risks and their associated costs are very important factors to consider in the planning and design of motorways in mountainous areas (Li et al., 2019). Studies of urban morphology and transport infrastructure have shown that the latter profoundly shapes urban spatial structures, leading to urban sprawl, car dependency, and increased traffic volume (Jaco et al., 2021). In European countries, comprehensive road safety strategies have been implemented, focusing on improving infrastructure, vehicle safety standards, and changing driver behavior (Martins et al. 2019). These strategies have led to a significant reduction in road deaths and injuries over the past few decades (Prus & Sikora, 2021). Similarly, in the United States, the concept of ‘forgiving roads’ has gained prominence, emphasizing the design of roads that minimize the consequences of driver errors, for example, by providing clear recovery areas and installing safety barriers. Road-related factors account for approximately 34% of accidents, many of which involve run-off-road crashes, intersection collisions, or head-on collisions. In Asian countries such as Japan and Singapore, advanced traffic management systems and intelligent transport technologies have been deployed to improve road safety, including real-time traffic monitoring, adaptive traffic light control, and automated traffic law enforcement. Regarding Africa, numerous studies highlight disparities across countries in terms of progress made and persistent challenges. Some emphasize that investments in infrastructure improvements, the implementation of restrictive policies, and public awareness are essential to reduce road accident deaths and injuries. Mrema and Dida (2020) analyzed the situation in Tanzania, highlighting that accidents are a major cause of mortality in both developed and developing countries, but that the African region faces specific challenges, including low investment in the maintenance and construction of adequate road infrastructure. Similarly, in sub-Saharan Africa, countries such as Rwanda, Kenya, and Ghana have adopted integrated safety strategies combining infrastructure improvements with stronger legislation and awareness campaigns. For example, Rwanda

has invested heavily in road construction and rehabilitation, combining this with strict enforcement of traffic laws, which has significantly reduced the number of accidents (Mrema & Dida, 2020). Kenya, meanwhile, has focused on standardizing road design, while Ghana has implemented awareness-raising and infrastructure-improvement programs to address the causes of accidents. Despite these efforts, many countries such as Cameroon, Nigeria, and Uganda continue to face high accident rates due to degraded or inadequate infrastructure. According to the most recent statistical abstract, Uganda registered more than 900,000 vehicles between 2017 and 2021, of which 60% were motorcycles and 15% were public vehicles (Ghaffarpassand et al. 2024). This increase in road demand, combined with poor road conditions, has increased the risk of incidents, particularly in the Kampala metropolitan area, where the main accident-prone areas are the east, south, and north of the city (Balikuddembe et al. 2016). The prevalence of poor infrastructure, coupled with inadequate speed control and widespread non-compliance with safety regulations, largely accounts for the persistent high accident rates. Studies also show that the lack of investment in infrastructure maintenance and modernization contributes significantly to the severity and frequency of accidents. Etendi and Zidan (2014) emphasize that the continuous management of driving behavior by dedicated centers, with data analysis, plays a key role in improving safety. Initiatives such as the implementation of recovery zones, the construction of separate lanes, and the installation of traffic control devices have proven effective in several African countries (Vaca et al. 2020). However, despite recognition of these issues, few African countries have ambitious national plans to thoroughly modernize their road networks. Limited financial resources, combined with rapid urbanization and increased vehicle numbers on the road, complicate the task. An integrated road safety policy, combined with better infrastructure management, appears to be an essential step in reducing the burden of accidents in Africa.

3. Methodology

3.1. Study Area

Cameroon is a country located in Central Africa, bordered by Nigeria to the west, Chad and the Central African Republic to the east, Congo-Brazzaville and Gabon to the south, and the Gulf of Guinea to the southwest. It has an area of approximately 475,442 km² and a population of around 30 million (United Nations 2025). Road transport is the most widely used means of transport in the country. According to the Ministry of Public Works, Cameroon has nearly 121,668 km of main roads, including 10,671.58 km of paved roads in 2024. In addition to the national roads connecting the main cities, there are also regional and rural roads. Cameroon has faced enormous challenges in terms of road safety for several decades. The increase in road accidents across the country is very worrying. Most regions of the country are affected by this scourge, but the roads with the highest number of accidents due to heavy traffic are in the central, coastal, and western regions. Our study will focus on the coastal region because this region contains the city of Douala, which is one of the most populous cities in Cameroon and also the country's economic capital.

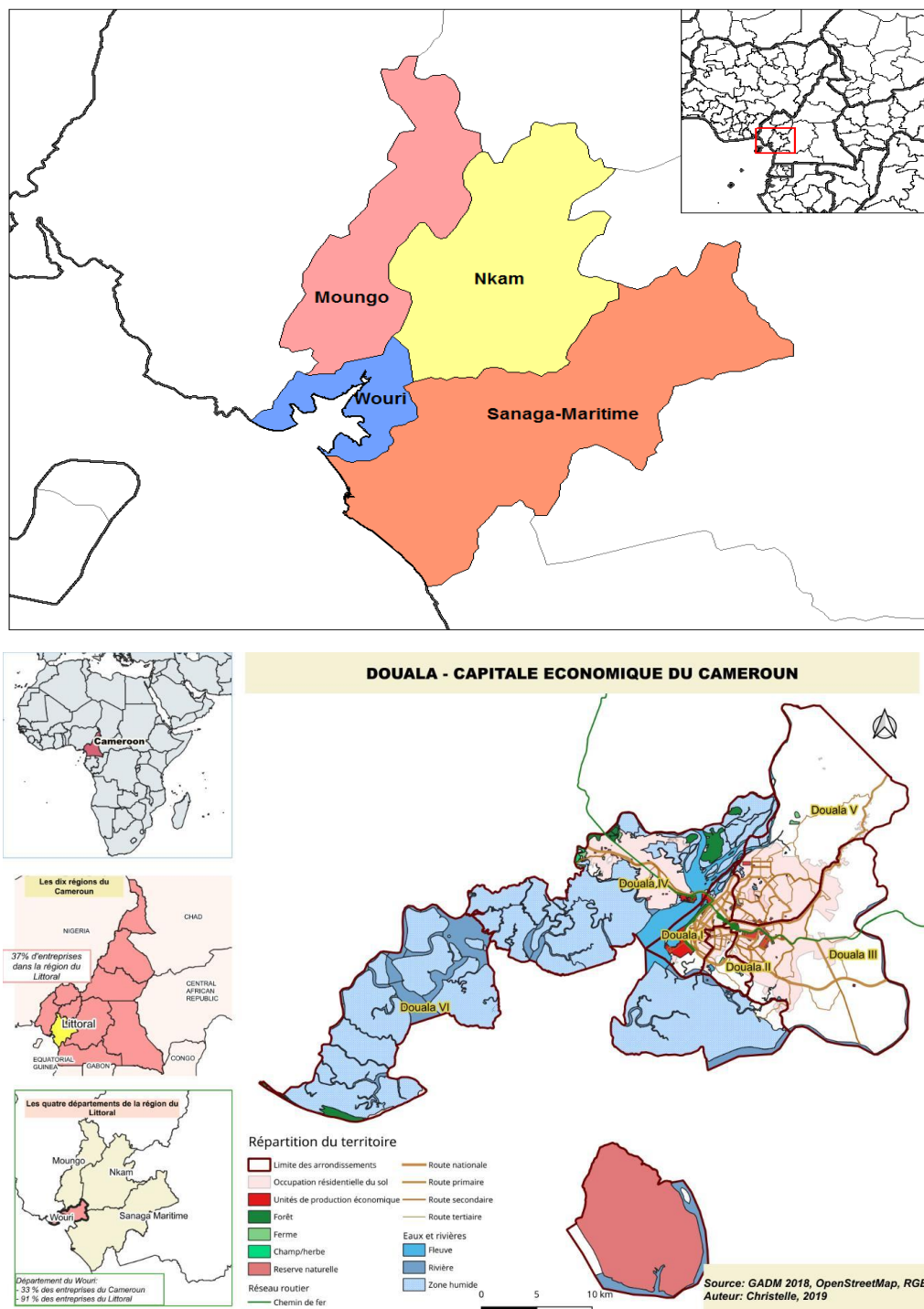


Figure 1. Map of the coastal region

3.2. Data Collection

In Cameroon, the collection, processing, and analysis of data on road accidents involve the police in urban areas, the gendarmerie in interurban areas, and the Ministry of Transport, which serves as the main recipient of analysis reports. For our study, we obtained secondary data from the 2021 and 2023 transport statistics yearbooks available on the Ministry of Transport website, and from the 2024 statistics yearbook of the National Institute of Statistics of Cameroon. Primary data was obtained from our field investigations. The data collection tool was an observation grid that included elements such as the type of road, its condition, road signs, terrain type, and shoulders. In addition, during this field mission, we interviewed 100 residents of the riparian areas, including eyewitnesses and accident victims.

3.3. Data Treatment

The collected data was entered and stored. It was then analyzed using IBM SPSS Statistics 27. For this analysis, we used statistical tools, including frequency analysis and SWOT analysis. Frequency analysis is a method for counting and summarizing the occurrences of different categories of a variable in a data set. In the context of our study on the impact of road infrastructure on user safety, this analysis enabled us to identify the percentage of roads in good, average, and poor condition. SWOT analysis is a strategic tool that allows us to systematically assess the Strengths, Weaknesses, Opportunities, and Threats related to road safety in the country. In terms of:

Strengths: We will identify the strengths of the current road safety system.

Weaknesses: This section will highlight existing shortcomings

Opportunities: We will examine opportunities for future development.

Threats: This analysis will highlight potential threats.

By integrating SWOT analysis with statistical methods, this study seeks to provide a comprehensive understanding of

road safety challenges and to propose practical solutions for improving infrastructure and reducing accidents.

4. Data analysis and Results

4.1. Traffic Accident Trends

Table 1. Traffic accidents in the coastal region

Years	2016	2017	2018	2019	2020	2021	2022	Total
Accidents	2156	1771	1367	1746	1461	1210	5141	14852

The accompanying figure 2 illustrates the trend in traffic accidents in the coastal region from 2016 to 2022. Detailed data analysis reveals significant fluctuations in accident numbers during this period. The years 2016 through 2021 are marked by relatively stable accident rates, which can be attributed to roadworks conducted in preparation for the African Cup of Nations football tournament. The decline in

accidents from 2020 to 2021 is primarily due to Covid-19 restrictions. However, in 2022, there is a marked increase in accidents, rising from 1,210 in 2021 to 5,141 in 2022, attributed to severe road deterioration, reduced enforcement of safety measures, and the resumption of economic activity following the Covid-19 lockdown.

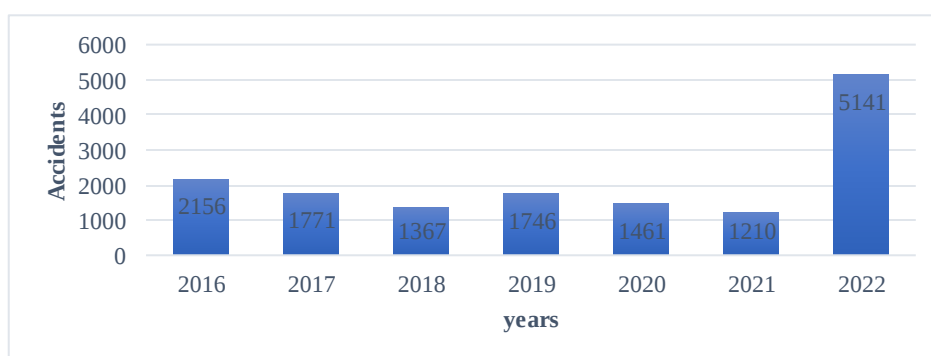


Figure 2. Accident trend in the coastal region

4.2. Road Network in The Coastal Region

The Cameroonian road network has three categories of roads: -National roads, which mainly connect regional capitals to the capital Yaoundé and Cameroon to neighboring countries. They form the backbone of the network. -Regional roads, which connect the main towns of the departments within a region to the regional capital; -Communal roads, which connect the districts within a department to the main

towns of the department. Between 2019 and 2023, the number of kilometers of paved roads in the Littoral region increased from 841.4 km to 1,053.8 km, representing approximately 25% of the region's land network. According to the MINTP, 20% of regional roads in the Littoral region will be in good condition in 2023, compared to only 8% in 2022. As for national roads in the region, this rate fell from 39% to 20% between 2022 and 2023 (Figures 3 and 4).

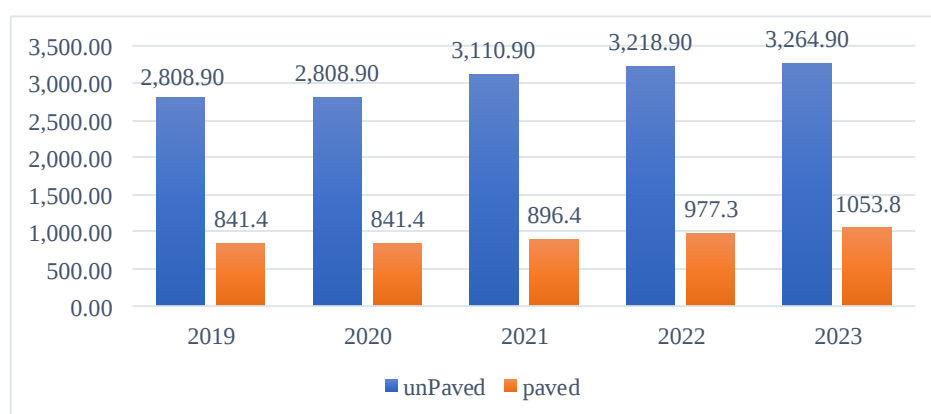


Figure 3. Evolution of the paved and dirt road network in the coastal region from 2019 to 2023

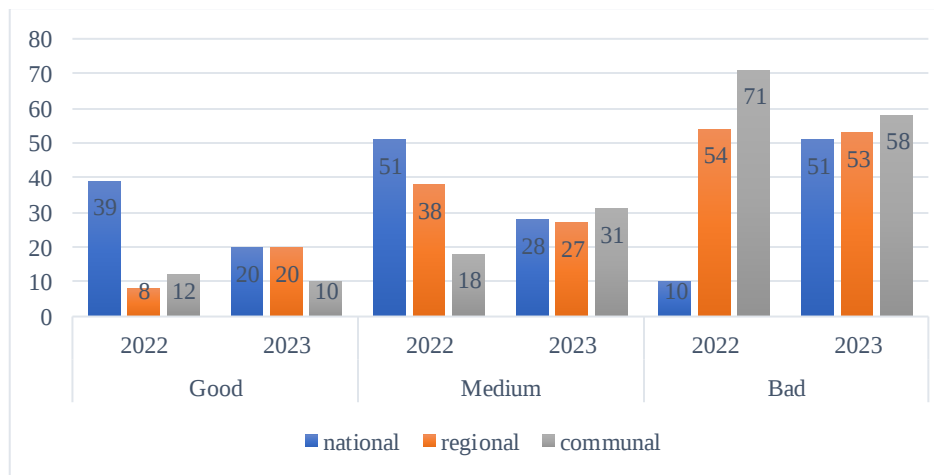


Figure 4. Evolution of the road network according to condition in the Littoral region (in %) in 2022 and 2023

4.3. Field Observations

Road width, number of lanes, and median: national and regional roads in this region consist of a 1.5 m* 2 wide pavement and a 7 m wide carriageway corresponding to two lanes separated by a 0.15 m wide white median. Rural roads are 3.5 m wide and have no pavement or median.

Presence of guardrails: guardrails have been installed in certain sections of the coastal road as a safety measure. However, observations indicate several issues: the guardrails are frequently damaged, obscured by dirt and vegetation, and often lack continuity. In some areas, the ends of the guardrails

are sharp, which poses a significant risk by increasing the severity of accidents if vehicles collide with these exposed ends.

Presence and condition of lighting: lighting infrastructure exists on some roads in the region, but its condition is often poor. This is concerning, as adequate lighting is essential for visibility and enables drivers to accurately assess the actions of other road users, particularly at intersections. Insufficient lighting impairs drivers' ability to interpret their surroundings, recognize traffic signs, and anticipate the behavior of others, thereby increasing the risk of accidents.



Figure 5. Condition of lighting

Signage: horizontal road signage, including markings and parking symbols, is present but often missing in certain locations. Vertical signage provides information such as dangerous bends, speed limits, petrol stations, and distances to towns. However, maintenance is inadequate; many signs are obscured by vegetation or poorly positioned, reducing their visibility to drivers and potentially contributing to road accidents.

Road surface and type of damage: the overall condition of roads in the coastal region is severely degraded. Most roads exhibit extensive cracking, deep and wide potholes, ruts,

depressions, and roadside subsidence. These issues result from prolonged exposure to traffic, adverse weather, and soil conditions. Surface irregularities diminish driving comfort and pose significant hazards. Ruts and cracks hinder vehicle control, while large potholes can damage vehicles and cause loss of control. In response, some drivers swerve into oncoming lanes to avoid impassable sections, increasing the risk of head-on collisions. Regarding side drains, we noted their presence in certain locations; most are overgrown with vegetation and soil, preventing rainwater from being properly channeled.



Figure 6. Road condition in coastal region



Figure 7. Road condition in coastal region

Rest areas: no official signage indicating roadside rest areas was observed in this region. Instead, informal plots of land along national roads are used by some road users as rest areas. The absence of designated rest areas is frequently identified as a contributing factor in accidents. Drivers often park on the roadside to rest, and the combination of narrow roads and inadequate lighting increases the likelihood of accidents in these situations.

4.4. SWOT Analysis of Road Safety in Cameroon

4.4.1. Strength

Government commitment: The Cameroonian government is aware of the challenges of road safety and has implemented policies to improve road infrastructure and raise public awareness. Example: To combat road insecurity, the authorities in charge of transport have put in place several texts and measures, such as the withdrawal of transport licenses for three months for agencies involved in accidents, the withdrawal of driving licenses for up to 2 years, as well as the installation of 25 speed radars across the country, traffic lights, and road signs.

Expanding road network: Projects to improve roads and build new infrastructure are underway, which may contribute to a smoother flow of traffic and a reduction in accidents. Example: According to the Cameroon Ministry of Public Works, 2075.19 km of roads have been built in the country between 2016 and 2023. This will facilitate traffic flow in major cities and open up several rural regions. The Cameroonian authorities' stated objective is to asphalt at least 6,000 km of new roads by 2030, in line with their National Development Strategy 2020-2030 (SND30). International partnerships: Collaboration with international organizations and NGOs that provide technical and financial support in the field of road safety. Example: Cameroon participated in the Decade of Action for Road Safety launched by the UN from 2010 to 2020 and is currently participating in the second

phase of the African Road Safety Action for the decade 2021 to 2030. The 2030 strategy aims to reduce the number of deaths and injuries on the roads by at least 50% between 2021 and 2030 by enabling targeted actions aligned with the UN targets and the SDGs, being consistent in efforts to improve road safety on the continent, monitoring performance across all countries, and mobilizing resources to enhance road safety.

Awareness programs: Increased awareness initiatives on safe driving practices, wearing seat belts, and the dangers of drunk driving. For instance, the Ministry of Transport regularly launches road safety campaigns to monitor and track road misconduct and criminals. During these campaigns, patrols composed of police officers, gendarmes, and agents from the Ministry of Transport are deployed on the roads, while other agents from the Ministry of Transport and certain non-governmental organizations visit travel agencies to raise awareness among drivers about road safety measures.

4.4.2. Weakness

Poor condition of the roads: Many roads are poorly maintained, with potholes and a lack of adequate signage, increasing the risk of accidents.

Absence of control and regulation: The lack of strict regulation regarding driving speed and the use of safety equipment (such as helmets and seat belts) contributes to reckless driving behavior. In fact, many drivers enjoy ignoring the most basic safety rules, knowing that they will not face any penalties.

Insufficient infrastructure: Transportation infrastructure in both rural and urban areas is often neglected, making it difficult to access emergency services and assistance.

Missing data: Statistics on road accidents are sometimes incomplete or inaccurate, complicating the development of effective policies. Indeed, to obtain data on traffic accidents, researchers are obliged to go to the field because the data at the level of the Ministry of Transport and the Institute of Statistics is incomplete.

4.4.3. Opportunity

External funding: Possibility of receiving additional funding from international organizations for road safety projects.

Advanced technology: The integration of modern technologies for traffic monitoring and accident data analysis, such as intelligent transportation systems, could improve road safety strategies.

Growing awareness: Increased public education on road safety could change driver behavior and reduce the number of accidents.

Sustainable development: The focus on safer and more eco-friendly transportation could promote road safety by integrating sustainable mobility solutions.

4.4.4. Threats

Increase in traffic: The Cameroonian population is constantly growing at a rate of 2.7%, and according to the WHO (2023), Cameroon will have 51 million inhabitants by 2050. This increase in population directly results in an increase in the number of vehicles on the roads, exacerbating road safety issues.

Reckless behaviors: A culture of negligent driving, with behaviors such as driving under the influence of alcohol or speeding, continues to pose a significant threat to road safety.

Corruption: Corruption within the law enforcement agencies can hinder the effective enforcement of traffic laws and weaken road safety efforts. Indeed, during police checks, drivers often bribe law enforcement officers when caught violating the traffic code.

Environmental changes: Extreme weather conditions can damage road infrastructure and increase the risk of accidents.

5. Discussion and Recommendation

5.1. Discussion

Road infrastructure comprises all elements and equipment that make up the network of roads, pavements, bridges, tunnels, signage, drainage, and other facilities necessary for the movement of vehicles and pedestrians. It serves as the material foundation for the secure and efficient movement of people and goods across the territory. The Cameroonian road network faces significant infrastructure challenges that compromise user safety. Indeed, the World Bank (2019) and the World Health Organization (WHO) report alarming accident rates, averaging 30.2 deaths per 100,000 inhabitants, largely due to deficiencies in road infrastructure. Cameroon recorded 11,803 accidents in 2016, 10,872 in 2017, 8,150 in 2018, 9,391 in 2019, 8,980 in 2020, 10,002 in 2021, and 13,735 in 2022 (TRANSTAT, 2023). These accidents represent a public health crisis, with devastating consequences for human life and the country's socio-economic development (Da Costa, 2007; Ram and Chand, 2016). To address this issue, the study examined the impact of road infrastructure on user safety in Cameroon, with a focus on the coastal region. Analysis of accident reports indicates that this region recorded 14,852 accidents from 2016 to 2022, primarily due to the poor condition of road infrastructure. Field observations in Douala, the economic capital, revealed a lack of bicycle lanes and widespread road deterioration, including potholes on both roadways and sidewalks. The roads are shared by cars, cyclists, and motorcycle taxis, typically consisting of two lanes (7 meters wide) separated by a white median. Both vertical and horizontal signage are deficient in several locations. The

deteriorated state of the road network extends beyond Douala and affects the entire region. According to the Ministry of Transport, only 20% of regional and national roads in the Littoral were in good condition in 2023, indicating that 80% of the roads are in poor condition.

5.2. Recommendation

Road infrastructure has a substantial impact on road safety in Cameroon. Poor maintenance, inadequate design, and insufficient signage contribute to a high incidence of accidents. The following recommendations are proposed to address these challenges:

5.2.1. Modernization and Securing of Existing Roads

Strengthen construction standards, apply international standards (e.g., PIARC, World Bank) for pavements, guardrails, and signage, and prioritize non-slip surfaces in rainy areas (e.g., Douala, Limbe).

Improve signage and lighting, install reflective signs, durable road markings, and generalize LED lighting on main routes (e.g., Yaoundé-Douala, Bafoussam-Bamenda).

Develop safety equipment, metal guardrails in high-risk areas (curves, bridges), and side sound strips to prevent road departures.

5.2.2. Fight against Corruption and Optimize Funding

Transparency in public procurement, publish calls for tenders and contracts on open platforms (e.g., ARMP Cameroon), and impose independent audits for projects

Encourage PPPs (Public-Private Partnerships), attract private investors through tax incentives, condition international aid on results, and link disbursements from donors (AfDB, EU) to performance indicators.

5.2.3. Strengthening the Institutional and Legal Framework

Create a National Road Safety Agency (ANSR), inspired by the French model, to centralize the management of road accidents and audits.

Reform the Highway Code (Increased penalties for speeding (automatic radars), failure to wear a helmet/seatbelt, driving under the influence).

Train local stakeholders, community awareness (via local radios, social networks).

5.2.4. Integration of Innovative Technologies

Mapping of accident-prone areas, using GIS (Geographic Information Systems) to identify black spots.

Deployment of intelligent systems, traffic sensors to regulate speed and dynamic signs alerting to dangers in real-time.

Mobile application for reporting, allowing users to report potholes, missing signs, etc.

5.2.5. Priority Areas for New Projects

Highways, completion of the Yaoundé-Douala axis with 2×2 lanes, extension of the Douala-Kribi highway, and construction of new roads.

Rural roads, opening up agricultural areas

Urban transport, creating rapid bus lines (BRT) in Yaoundé and Douala, and secure bike lanes, renovation and expansion of railway lines.

5.2.6. Road audits

Road safety audits are a proactive approach to identifying potential hazards related to the design and operation of roads (Awsarmal et al. 2020). These audits involve a systematic review of road projects by independent experts to assess their safety performance and recommend improvements.

5.3. Comparative Analysis

Table 2. Comparative analysis between Cameroonian roads and Chinese roads

Criteria	Cameroon	China
State of the road	51,350 km of roads, of which 10% (6,760 km) are asphalted and 47,242 km are unpaved. Of the country's 10% paved roads, 76% are in poor condition (Judicaël SANDJONG KANDA and al).	China's total road length reached 5.19 million km, including 160,000 km of expressways, with a rural road paving rate exceeding 95%. (Ministry of Transport of China, 2020).
Roadway width	Rural roads: Approximately 3 to 3.5 meters per lane. Nationals Roads: Generally 6 to 7 meters for two lanes (Ministry of Transport)	Standard Lane Width for Urban Roads: 3.75m, Highways: 3.5-4.5m. (Ministry of Transport of China, 2020).
Highway network	By 2025, Cameroon will have around 300 km of fully operational freeways, with extensions underway (Ministry of Transport).	China has the largest highway network in the world, with over 170,000 km of freeways by 2023 (Ministry of Transport of China, 2023).
Road safety	High rate of road accidents 30.2 deaths per 100,000 inhabitants (World Bank 2019), safety infrastructure often inadequate, with few facilities such as guardrails and road signs, but nevertheless the government is trying to change things with the installation of 25 radars, 10 of which are semi-portable, throughout the country and awareness campaigns organized by the Ministry of Transport to counter road insecurity.	More than 10 billion yuan (1.4 billion USD) invested between 2020 and 2022 to modernize road safety equipment (safety shield, speed control device, and extensive awareness campaigns). China Transport News (2022) - Ministry of Transport
Public Transport System	Inefficient public transport system; reliance on motorcycle, taxi and private vehicles. The country has not yet developed major infrastructures such as subways and buses.	China has the world's largest public transport network: Metro: over 10,000 km TGV: 42,000 km (95% of major cities connected) Electric buses/BRT: over 50 cities connected, 80% of the world's electric buses Innovations: Mobile payment, autonomous buses, AI for traffic management Ridership: over 78 billion annual trips (metro, bus, TGV)
Maintenance	Lack of resources and management, often insufficient infrastructure maintenance. Budgets allocated to maintenance are usually limited or diverted to personal needs.	China allocates 3.5% of its total expenditure to proactive maintenance of its road network (World Bank, 2021), using innovative technologies (drones, AI) for regular inspections. Thanks to this rigorous approach: 94% of freeways are in good condition (vs. 70% worldwide) 35% drop in infrastructure-related accidents since 2015
Road shoulders and safe spaces	Shoulders present on some lanes (1.5*1.5), often inadequate and few safe spaces for pedestrians and cyclists	China has systematized safe facilities for pedestrians and cyclists: -Wide shoulders (2.5-3.5 m); -Separated bicycle lanes -Protected sidewalks (over 2 m). 40% reduction in pedestrian/bicycle accidents (2015-2021) in model cities (Shenzhen, Hangzhou) China Academy of Transportation Sciences (2021)
Technology Innovation	The country is beginning to integrate certain technologies into traffic management (25 radars, 10 of them semi-portable, also In September 2022, In September 2022, the Ym@ne driver project was officially launched by the Minister of Transport in collaboration with MTN Cameroon and CAMTRACK. This centralized solution aims to manage and track intercity buses)	China deploys advanced technological solutions to optimize its mobility: Intelligent control (AI systems adapting traffic lights in real time, Surveillance by over 300 million cameras, plate recognition) Digital tools (Apps Baidu/Amap 500M users, for navigation and alerts Centralized platforms analyzing 90% of national traffic) Key impacts: 25% reduction in traffic jams (2018-2023) 15% fewer accidents in smart cities (Ministry of Transport 2023, Tencent Research 2022)
Infrastructure Financing	Dependence on international aid and loans; Public-Private Partnerships (African Development Bank) Corruption problems are hindering investment (World Bank, 2021).	China massively supports road development through Public investment (6% of GDP allocated to infrastructure by 2021) Public-Private Partnerships (PPP) (International banks (Asian Investment Bank) Chinese Ministry of Finance (2021)

6. Conclusion

This study underscores the critical relationship between road infrastructure quality and user safety in Cameroon. Persistent deficiencies in road surfaces, signage, and maintenance are shown to significantly contribute to road accidents. The analyses confirm that the degraded state of the

road network, coupled with the lack of rigorous maintenance policies, increases user risk and elevates roads to a major public health concern. Reversing this trend requires urgent, coordinated action. Substantial investment in modernizing critical infrastructure, such as road repairs, compliant signage, and safety equipment, is essential. Institutional reforms are also necessary, including strict enforcement of sustainable

construction standards, the establishment of preventive and regular maintenance mechanisms, and the enhancement of audit processes to ensure compliance. Additionally, a multi-stakeholder consultation framework involving the State, local authorities, the private sector, and civil society is recommended to ensure transparent and sustainable road network management. By adopting best practices from regional and international contexts, Cameroon can transform its road network into a reliable and functional asset. This combined technical and political approach is vital for sustainably reducing accidents and safeguarding road users.

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