

Atmosphere of Accidents along the Douala-Yaounde National Road in Cameroon: Hoofmarks, Drivers, Challenges and Proactive Options

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Abstract

Road transport and safety is a thorny problem in the world today following the occurrence, recrudescence and outcomes of accidents in our society. These accidents are a public health hazard and vector of underdevelopment in developing countries amongst which is Cameroon. According to the World Health Organisation, road accidents ranked 3rd in position among the leading causes of mortality in the world and caused approximately 1.2 million deaths with 50 million people injured worldwide. The frequency of accidents along National Road 3 linking Douala (the economic hub of the CEMAC region) and Yaounde (the political Capital of Cameroon) remains a thorny problem. This is because 50 % of accidents in the Southern part of Cameroon occur along this stretch of the triangle of death necessitating sustainable strategies to effectively curb the situation. Efforts both structural and non-structural have been put in place over decades by the Cameroon government, civil society organisations, Non-Governmental Organisations, local communities, and other actors to contain the situation without success. This is because the measures often target road users, the state of vehicles and repair of existing roads. Along National Road 3, the poor state of the road in combination with other risk factors has been identified as prime factors that sustain accidents. This paper argues that the frequency of accidents is high, impacts on man and property enormous and the solutions to solve the problem ineffective. The methodology used for data production exploits primary and secondary sources of data from works on road transport in Cameroon, Africa and the world to assess the dynamics, outcomes, challenges and options for road accidents control on the study site. These sources integrate field surveys, administration of ques-

tionnaires, literature review and grey data sources for their findings. The results show that until recent on some roads little attention has been paid on proactive solutions visible in other countries to combat road accidents. These are the creation of multi lanes to reduce contact, investment on alternative transport modes and road modernisation to decongest existing roads. How this innovation to curb road carnage redresses the problem in question is also a focus of this paper.

Keywords

Accidents, Douala-Yaounde National 3, Highway, Opportunities, Road Transport

1. Introduction

Road transport plays a key role in the movement of people, goods and services in the world. Despite this primordial role, road safety remains a thorny problem following the frequency of accidents and resulting road carnage, injuries, and property damage. According to the [1] [2], road accidents ranked 3rd in position among the leading causes of mortality in the world and caused approximately 1.2 million deaths with 50 million people injured worldwide in 2013. In Africa, deaths from accidents increased from 1.24 million to 1.35 million per year in 2018 [3]. In Nigeria, data from Federal Road Safety Corps and Statistics Bureau show that between 2013 and 2020, 41,709 lives were lost from road accidents making them one of the leading causes of death [4]. The Douala-Yaounde road axis in Cameroon considered as the busiest along the Douala-Bangui, Douala-Ndjamena, and the Brazzaville-Bangui corridors is a death trap for humanity following the occurrence and frequency of accidents [5]. The frequent road accidents along this axis which also links up Bafoussam in Western Cameroon have made the national road to be referred to as “The Triangle of Death”. Apart from deaths and injuries recorded, the monetary cost of road accidents along this lane is high and contributes significantly to the Cameroon estimated total loss of 100 billion CFAF representing 1% of her Gross Domestic Product (GDP) per year [6].

Road accidents along the Yaounde-Douala National Road no 3 are attributed to three main factors namely reckless driving, poor state of vehicles and the nature of the road. Unfortunately, high accusations are given to road users as the main cause of road carnage. The indexation of drivers masterminds the crucial role played by poor state of the road as prime factor of road accident and crash. This perception has diverted attention from structural factors to indexation of road users as having a dangerous prone driving culture. The article seeks to raise a case against the paradigm in Cameroon road safety discourse that road users are the prime cause of road transport accidents. That enforcement of punishment against reckless driving rather than improving on existing road infrastruc-

ture and quality to meet current standards is the sustainable therapy to mitigate road menace. The paper also presents the challenges and sustainable options to redress road safety between Douala and Yaounde using evidence-based therapies.

2. Methods, Material and Analysis Framework

The methodology used for this study included research design, data collection and method of analysis. The descriptive research design was adopted for the study. This consist of questionnaire administration and interviews to capture the opinion of different stakeholders and their perceptions of road transport, insecurity and safety measures.

Data for the paper was collected from primary and secondary sources. Using a random sampling, 400 questionnaires were distributed to different categories of road users and administrative authorities. This was to sort their opinion on the state of road transport injuries and the benefits of the construction of a highway connecting Douala and Yaounde to redress the problem. Random sampling was adopted to outreach the targeted population (road users and decision maker). 318 questionnaires were administered to drivers (17.3%), residents along the national road (15.7%), roadside vendors (14.1%), pedestrians (12.9%) and managers of heavy-duty vehicles comprising transport agencies and trucks (19.5%). This sample size and distribution was determined from statistics on drivers and passengers compiled at travelling agencies, estimates during pilot surveys on population settled along the road and those carrying out commercial activities there. The questionnaire administered, provided information on the dynamics of road accidents, drivers, outcomes and expected fall outs of the Douala-Yaounde Highway under construction to road users and their communities. Opinions were also sorted during field surveys on risk factors along the existing National Road 3 and measures put in place to curb accidents along the highway under construction. Road segment exposure rate was determined using the approach developed by researchers of the U.S. Department of Transportation [7]. Literature on road transport problems and management in other countries of the world was gathered from libraries, digital libraries, journals and the Cameroon Ministries of Public Works and Transport for in-depth analysis and mapping. The data collected from questionnaires was analysed using computer assisted techniques (Statistical Package for Social Science 17.0 (SPSS)). Descriptive statistical analyses (frequencies tables, bar charts, pie charts) were done using the excel statistical software package to display the data collected.

3. Results

3.1. Physiognomy of Yaounde-Douala National Road 3 and Risk Factors

The Yaounde-Douala National Road covers 243 km stretch and passes through major localities such as Nomayos, Mbankomo, Matomb, Boumnyebel, Pouma,

Edea and Douala. This road axis was constructed between 1982 and 1985. The Germans first established the road to facilitate the administration of local populations and easy movement of goods from the hinterland of Cameroon to metropolitan Europe. The very first works on this road were done with forced labour referred to as “*Njutmass*” under the German colonial rule. With the rapid growth of population, mobility of goods and services and galloping urbanization of the primate cities of Yaounde and Douala in the last century, these roads have become inadaptable to this traffic flow. The different sections and segments of the Yaounde-Douala-National Road 3 have been presented on **Table 1, Figure 1**.

Table 1 illustrates the characteristics of the Douala-Yaounde National Road

Table 1. Sections and segment of the Douala-Yaounde National Road 3.

Road Segment	Stretch	Distance (km)	Nature
1	Yaounde-Boumnyebel	91	Steep slopes, narrow bends, forest cover
2	Boumnyebel-Pouma	38	Level land, many bents, streams
3	Pouma-Edea	48	Gentle slope, many streams, woodlands
4	Edea-Douala	66	Level land, many potholes, streams, foggy weather

Source: MINTP, 2015.

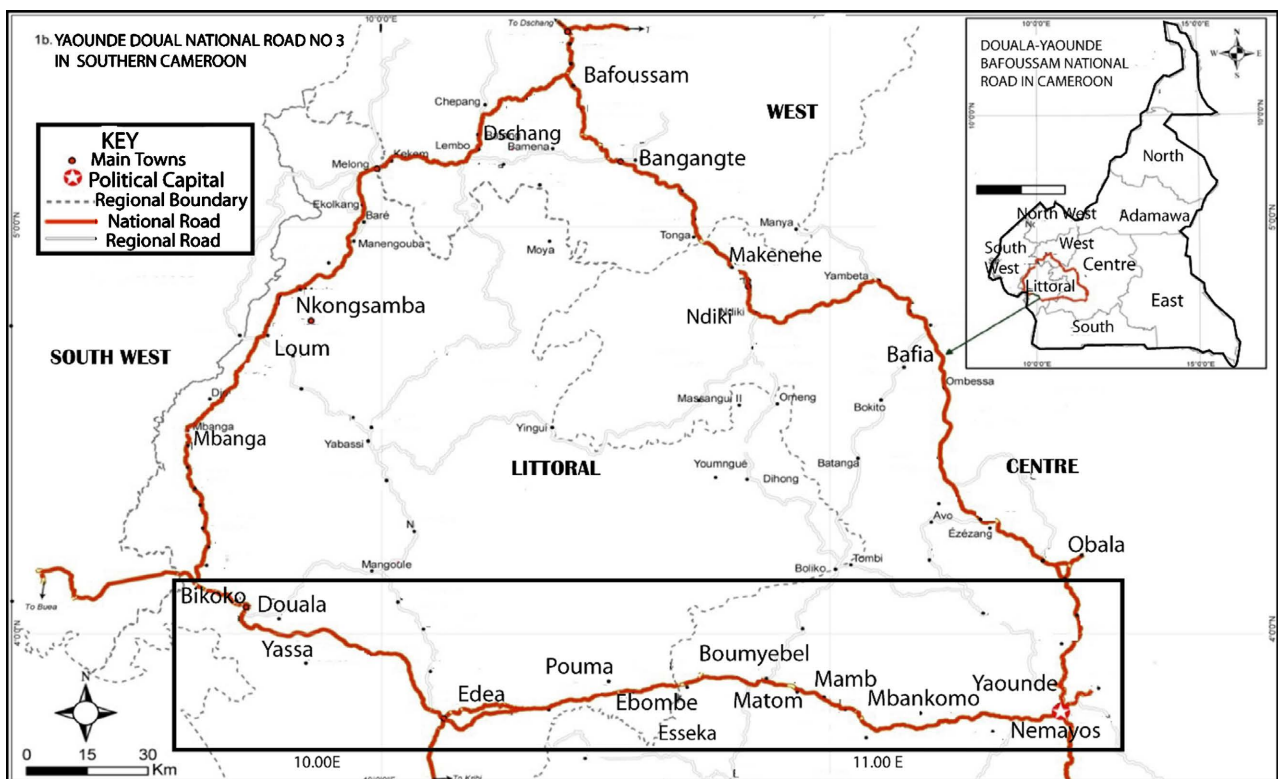


Figure 1. Layout of the Douala-Yaounde Highway.

with regards to the different segments, extension, stretches and nature of the relief on which they cut across. The longest segment stretches from Yaounde to Boumnyebel (91 km). This segment is followed by the Edea-Douala (66 km), Pouma-Edea (48 km) and Boumnyebel-Pouma (38 km) stretches. The National Road 3 has a width of 7 m with each lane marked out measuring merely 3.5 m wide.

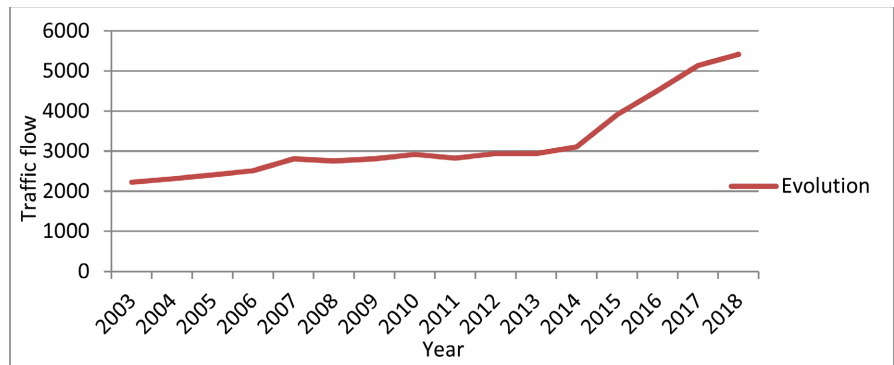
The narrow lanes are not separated by medians along several segments. Only a white middle line which is faded in some areas have been traced as a solution to reduce vehicle contact. In addition, parking lots, bus stops, emergency lanes amongst others were not provided. The speed bumps fabricated on them to reduce excessive speed are deplorable. A survey of these speed breakers shows that approximately 47.5% of the bumps do not have indicators or signs to alert drivers, many (31.1%) are highly degraded and only 21.3% having alert signals bringing into question their legality. This is the case of the Edea-Douala Road segment. As concerns the road signs placed near the road to guide drivers and road safety, several are below standard as close to 40.9% are invisible, 43.8% of the road signs have been neglected in bushes and 15.3% poorly located. Roadside facilities such as pedestrian lanes, lighting systems are largely insufficient, outdated and defective. These inadequacies are a threat to population transit and vehicles circulation especially at night and during periods of heavy rainfall. The conception and construction of the Douala-Yaounde National Road paid little attention to the provision of facilities for people with physical disabilities, as more than 90% of segments of the road are ill adapted for the circulation of vulnerable road users. The poor policies implemented have rendered National Road 3 unfriendly to road users in vulnerable situations. The afore-mentioned risk factors along National Road 3 have warranted the construction of a new and modern road to boost transportation for a sustainable society.

3.2. Traffic Flow, Congestion and Accidents Dynamics

The Douala-Yaounde road axis has a dense traffic, the highest in the study area and Cameroon at large. Traffic flow on this road axis has been on the rise over the years (**Figure 2**).

Traffic along the Douala-Yaounde Road has been on the increase over the years. Apart from mild increments between 2003 and 2014, the rate has been very high till present. The number of vehicles plying the road (56133) is high. Car importation has increased and interactions between Yaounde and Douala. The attractiveness of these cities due to many opportunities they offer accounts for this increase. Douala being the economic hub of Cameroon and Yaounde the political seat has experienced a high rate of urbanisation which increases the interaction and volume of flow between the towns (**Figure 3**). This urbanisation is the outcome of influx of migrants and natural growth of the population.

As seen on **Figure 3**, Douala and Yaounde stand out as the primate cities of Cameroon with the largest urban population, followed by Bamenda and Bafoussam



Source: Nnecdem, 2015.

Figure 2. Evolution of traffic along Douala-Yaounde, 2003-2018.

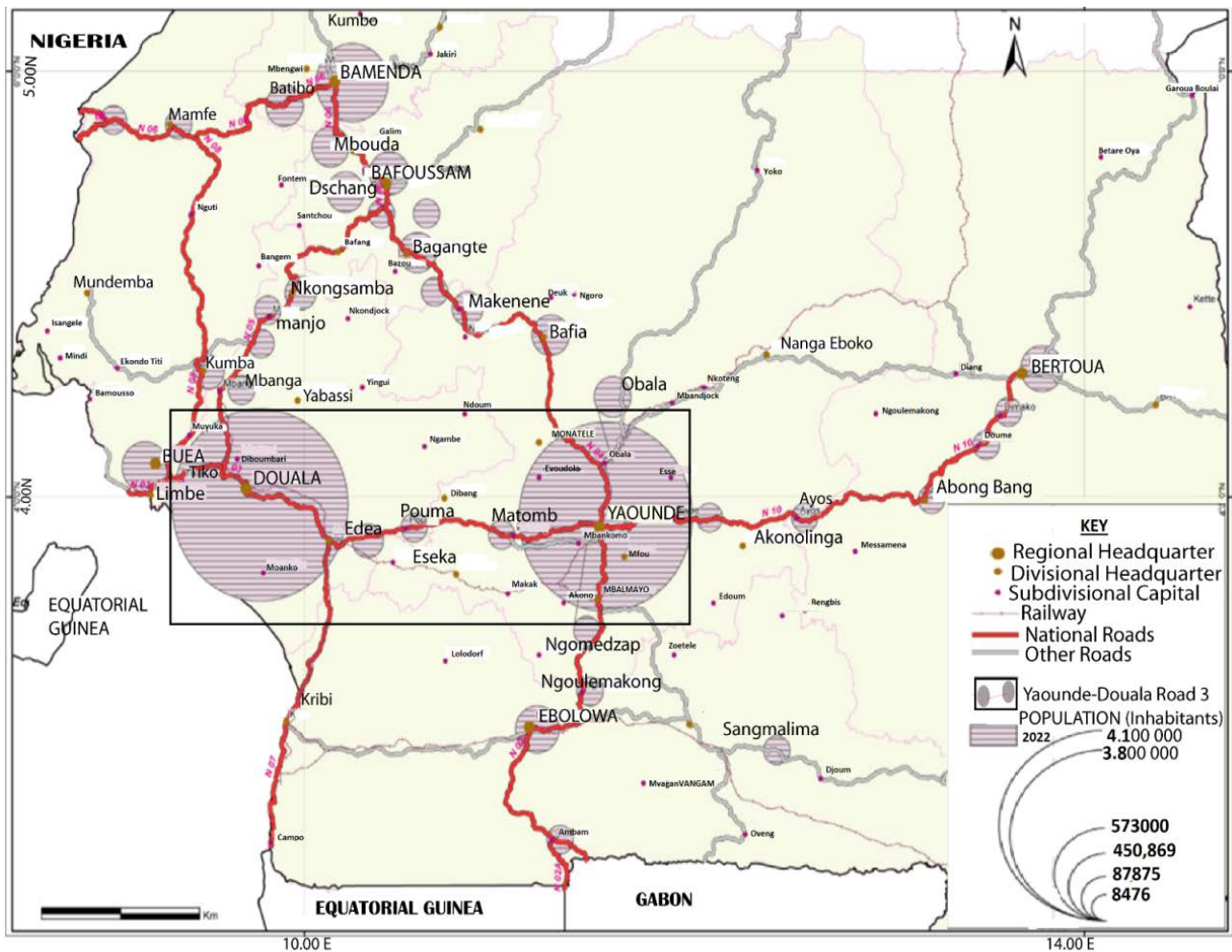
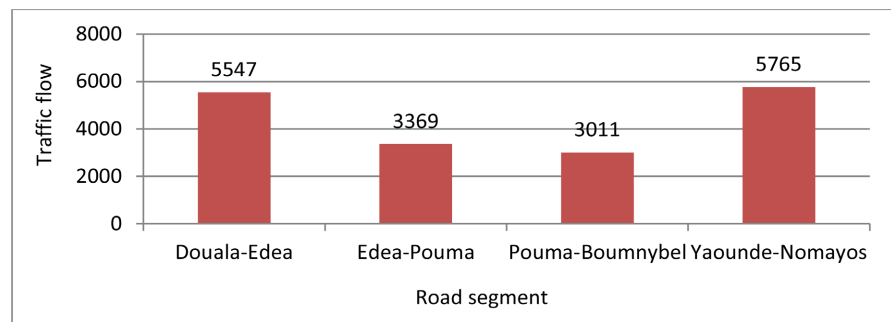


Figure 3. Population of some towns in the southern part of Cameroon, 2022.

and other towns. Traffic flow between the towns to facilitate the mobility of people, goods and services through interactions is high. The problems highlighted affecting the road linking these cities is a contributing factor to road accidents. Traffic flow along National Road 3 is very high and varies along the different road segments daily. A census conducted along the different stretches connecting

Yaounde and Douala was revealing. Between Yaounde and Nomayos the average daily traffic is 5765 vehicles, at Boumnyebel-Pouma 3011 vehicles, Pouma-Edea 3369 vehicles and 5547 vehicles along the Edea-Douala segments [8]. This statistic shows a high volume considering the narrow nature of the road. The highest flux is observed at localities in the neighbourhoods of Yaounde and Douala where population density is high in these residential areas and number of vehicles many that are moving out of the cities to the peripheries (Figure 4).



Source: MINTP, 2015.

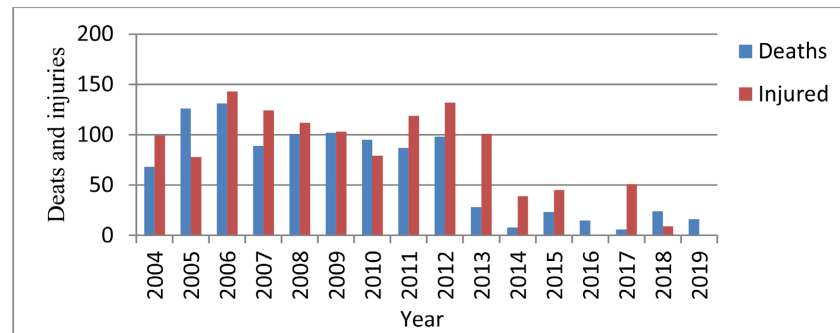
Figure 4. Average traffic per week along the Douala-Yaounde Road.

Figure 4 shows that traffic flow on the Yaounde-Nomayos stretch of the road is highest followed by the Douala-Edea and Edea-Pouma segments. The Pouma-Boumnyebel segment has comparatively low traffic. According to Reilly's Breaking Point Model, Douala and Yaounde have population sizes of 1.931977 and 1.881876 million respectively [9]. Areas within a distance of 122.3 km from Douala are under the influence of Douala and those within 120.7 km range are influenced by Yaounde. Edea, Pouma and Boumnyebel are areas close to Douala that pull customers for its commercial, industrial and other economic services. Yaounde urban field also attracts Nomayos, Mbankomo and Matomb areas leading to high volume of traffic as typical of many African primate cities [10].

3.3. Hotspots of Road Accidents

Hot spots are also referred to as blackspots. These are points where several lives have been lost, injuries incurred, and property destroyed along the Yaounde-Douala National Road 3. The Yaounde-Nomayos, Boumnyebel-Pouma, Pouma-Edea, and Edea-Douala segments have several black spots including Sombo, Mahole, Pouma, Boumnyebel, Mbankomo, Ahala and Nomayos. On the "triangle of death" comprising National Road 3, National Road 4 and National Road 5 in Cameroon, National Road 3 has witnessed the highest death toll (50%) and injuries (22.3%) and property lost (Figure 5). Accidents along this road manifest in different ways. These are head-on collisions, run-off, roll-over, rear-end collisions and multi-vehicle collisions.

As seen on **Figure 5**, between 2004 and 2018, close to 1017 deaths were recorded with an annual average of about 68 deaths and approximately 4 deaths along each kilometre. Within the same period close to 1234 injuries with an



Source: Pouma Hospital, Gendarmerie Post, MINT, 2018.

Figure 5. Situation of Death and Injury along National Road 3.

average of 82 people per kilometre were registered [11]. The victims of these accidents have been students, the university teaching core and administrative personnel, religious leaders and their faithful, businesspersons, state administrators and people of other walks of life. These victims either die on the spot or incur serious injuries that make them spend several weeks under intensive medical care in hospitals. Several of the victims have become orphans, widows, widowers and disable persons living in psychological trauma and economic hardship throughout the rest of their lives as is the situation other sub-Saharan African Countries [12] [13].

4. Drivers of Accidents Leading to a Highway Construction

Different schools of thought have brought out theories to explain this phenomenon. Psychologists have put forth the accident-prone theory developed by [14], zooming the human factors such as error, overload, training and lifestyles, as the main explanatory variable. This theory is opposed to the system theory that attributes accidents to failure of the entire traffic system, attributing responsibilities to drivers, state of the vehicle, and road infrastructure. The occurrence of road accidents along the Douala-Yaounde national road 3 in Cameroon is attributed to three main factors. These are reckless driving, poor state of vehicles and nature of the roads.

4.1. Reckless Driving

Public discourse in Cameroon and government cycles have attributed responsibilities of accidents to road users. Drivers are accused for aggressive practices during driving. These practices are dangerous overtaking, excessive speeding and overloading, drunkenness and drug addiction to stay alert, driving for long hours and tiredness, poor working conditions and hunt for money, failure to put on seat belts, distraction by passengers and cell phone calls, violation of the highway code, and illegal driving permits obtained through bribery and corruption. Drivers and car owners are also accused for the poor state of their vehicles that ply the Yaounde-Douala National Road 3 and other national roads inking the area. This situation is aggravated by the fact that most road users are aware of

the rules and safety measures governing road use but due to laxity, they do not respect them leading to accidents and crashes. It is for this reason that government measures and policy to reduce accidents have focused more on the monitoring, policing and tracking of reckless driving and control of state of the vehicles that ply the Yaounde-Douala National Road 3 and beyond. The Cameroon security service bringing together mixed control of vehicles by the gendarmerie, police and the army in collaboration with Cameroon Radio and Television (CRTV)-one of the vibrant public media services in Cameroon have been involved in tracking of road traffic violations and other forms of indiscipline. Defaulters are levied fines varying from 3000 - 50,000 FCFA. The action has not succeeded in road injuries reduction as is the picture in other African Countries [15]. Little attention at this level is paid to managers of technical services responsible for vehicle maintenance and delivery of certificates of road worthiness for circulation. In this case accidents resulting from state of vehicles go beyond the driver's control. These technical lapses, brake failure, poor lighting, tyre punctures, steering breakage, electrical shocks amongst others often result to ugly road accidents and crashes wrongly attributed to drivers (Figure 6(a)).

In interviews conducted at some travelling agencies, it was revealed that drivers receive very little salaries from vehicle owners despite their hard work to promote these businesses. Drivers receive salaries less than 100,000 CFAF per month. The salaries of drivers of 30 bus seaters do not exceed 70,000 CFAF per month while those of 70-seat buses and drivers of trucks range from 70,000 to 100,000 CFAF. These salaries are discouraging with negative outcomes on drivers' quality inputs. Drivers complain of poor working conditions marked by lack of motivation, assurances, job insecurity (frequent dismissals, long hours of driving without rest). Driving for more than 10 hour/day leads to fatigue and accidents. This condition affects the quality of services they render and risk of road insecurity. Due to low salaries, drivers are obliged to engage in dangerous practices such as picking of passengers and overloading along the national road to raise their income level. Frequent bribes referred to as "*ngombo*" made to traffic control agents reduce incomes generated from picking up passengers and overloads.



Figure 6. (a) Remains of persons suffering from road carnage at Pouma (Source: Authors, 2018); (b) goods damaged from road accident at the Matom hills (Source: Authors, 2020).

According to the drivers sampled, road accidents on the Yaounde-Douala Road result from alcoholism and drug abuse (3.9%), reckless overtaking (6.6%), excessive speed (12.9%), distraction and carelessness (11.9%), poor mastery of driving (8.3%), poor state of vehicle (9%), poor mastery of road (4.9%), abusive parking (5.5%), poor state of road (12.7%), poor road signs (8.6%), tiredness and fatigue (9.5%) and poor weather conditions (6%).

4.2. State of Roads

The poor state of the Yaounde-Douala National Road 3 is a prime factor often under rated and adamantly neglected by the state. This national road is characterised by dangerous potholes, long neglected culverts, many damaged stretches, dangerous speed breakers (Figure 7), neglected road signs which have been invaded by vegetation, absence of stoppage and parking points which have led to anarchical parking of vehicles along the narrow road leading to accidents.

As seen on Figure 6, the different types of speed bumps placed along the road to promote road safety are degraded. Speed bumps installation is effective in reducing the frequency and severity of vehicles collisions. They help to improve pedestrian safety and passively reduce the number of vehicles exceeding the recommended speed limits. In residential areas where high traffic is common, the installation of speed bumps can greatly improve on the safety of pedestrians, motorbike riders and children. Children are highly susceptible to accidents in densely settled places. It has been observed that vehicle collisions are responsible for the greatest number of deaths of American children aged 5 - 14 [16] and other age groups in the world involved in reckless driving and excessive speed [17] [18].

Prior to maintenance works in view of the African Nations Cup organisation in Cameroon, the Douala-Yaounde Road axis had also suffered from major subsidence resulting from managerial problems. Constructed in the 1980s, the road is old with little maintenance works. The road like others was poorly conceived without a plan for periodic repairs. This has been the reason for its neglect. Most

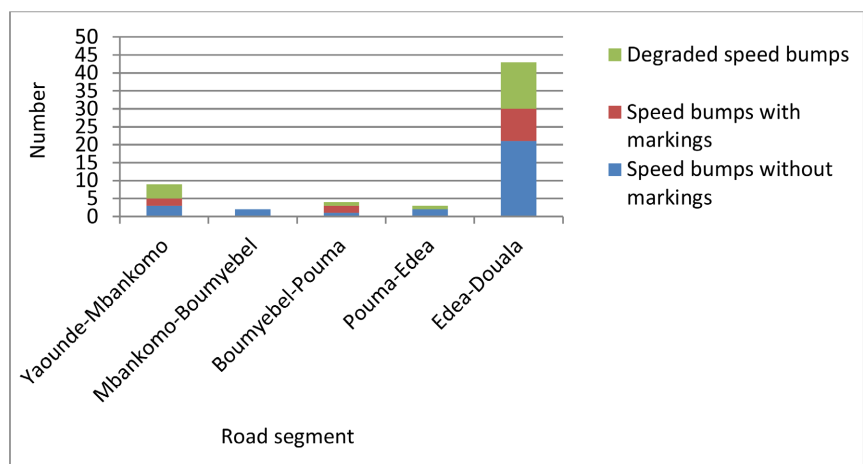


Figure 7. Situation of Speed bumps along the Yaounde Douala National Roads.

of the facilities (culverts, road safety signs, the lane) have remained for long without maintenance. Many of the culverts are dilapidated and vulnerable to collapse (**Figure 8**).

Road signs are essential facilities to regulate drivers driving behaviour to enhance road safety. It is unfortunate that most vertical road signs along this road axis do not meet international standards. Apart from the deplorable state of the driving lanes, the quality of vertical road signs along this road from Douala to Yaounde and beyond (the Bangui corridor) remains poor (**Table 2**).

The stretch between Boumnyebel to Pouma, Edea and Douala and Yaounde to Mbankomo, are the most affected by poor road signs and Edea to Pouma the least. On the contrary Pouma-Edea ranks first in invisible road signs due to periodic invasion by the vegetation and neglect by road management authorities. Several of the signs are poorly located. These factors increase the vulnerability to accidents. The Yaounde-Douala, Yaounde-Bafoussam and Bafoussam-Douala national roads that are the busiest in Cameroon when compared to other national roads rank first in disorder linked to poor road signs (**Figure 9**).

Figure 9 shows that out of 75 invisible road signs observed, the Yaounde-Bafoussam road alone had about 44%, while 30.7% and 25.3% were found along the

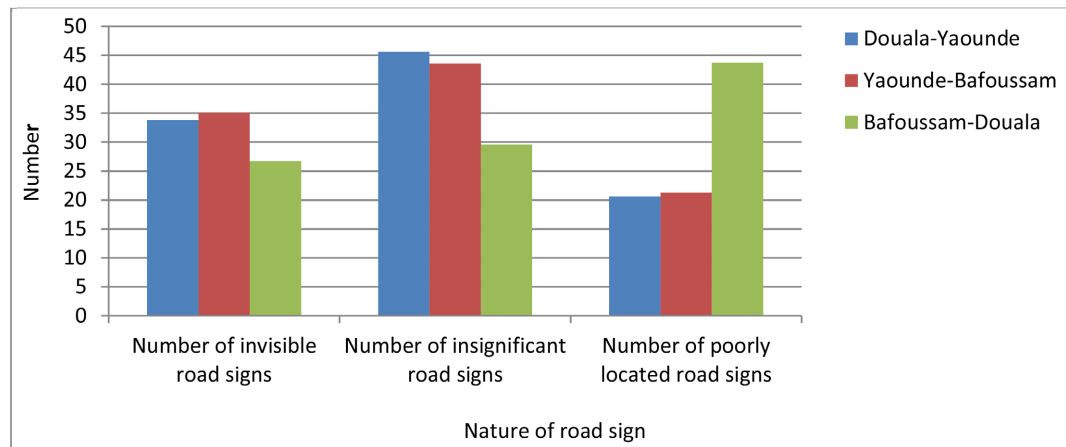


Figure 8. A section of road collapsed and passengers crossing on foot. (a) Collapse of a culvert along the Douala-Yaounde National Road Note the van trapped and stranded passengers observing the scene (Source: Nnecdem, 2019); (b) stranded passengers crossing a bridge with the help of security agents to get relay buses for their journey (Source: Ojuku, 2019).

Table 2. Distribution of poor vertical road signs on the Yaounde-Douala road axis.

Road section	Number of road signs observed	Invisible road signs	Insignificant road signs	Poorly located road signs	Total (%)			
Yaounde-Mbankomo	31	13	%41.9	12	%38.7	6	%19.4	100
Mbankomo-Boumnyebel	47	9	19.2	27	57.4	11	23.4	100
Boumnyebel-Pouma	33	13	39.4	16	48.5	4	12.1	100
Pouma-Edea	52	31	59.6	13	25	8	15.4	100
Edea-Douala	40	17	42.5	21	52.5	2	5	100
Total observed	203	83	40.9	89	43.8	31	15.3	100

Source: Fieldwork, 2017.



Source: Nnecdem, 2021.

Figure 9. Distribution of poor road signs per road axis.

Douala-Yaounde and Bafoussam-Douala roads respectively. Road signs help to orientate road transport and safety. Unfortunately, many of these road signs placed along the Douala-Yaounde National Road are poor, neglected, and non-functional. This situation has led to heavy loss of lives and property (**Figure 6**).

4.3. Narrowness of Roads and Invasion by Vegetation

The narrowness of the road has been a factor of proliferation of road accidents on the study site. The roads long conceived in the 1970s have been outdated. The dimension is narrow making passage of vehicles very difficult. The Yaounde-Douala Road is not only narrow but in an advanced state of dilapidation. The excessive speed of vehicles, recklessness of drivers and other factors are contributing factors for loss of lives and properties. The narrowness of the road added on their neglect without regular maintenance have led to invasion by vegetation and blockage by trees that fall at random on the road after heavy winds and rainfall. This has been a factor of proliferation of accidents along the Douala-Yaounde (**Figure 10**). Sometimes the cloudy weather that often accompany storms and heavy rainfall, obstruct visibility, and increase risk of accidents [19]. These natural hazards are often experienced between Edea and Douala adjacent to the Atlantic Ocean.

4.4. Nature of Vehicles

Several vehicles plying the Douala Yaounde national road 3 are old. The technical condition and probability of causing accidents is high. Some have not been controlled before engagement on passengers and goods transportation. Others do not have seatbelts, daytime running lights and brakes. The vehicles have been adapted to carry more passengers and goods beyond the capacity set by manufacturers. Other vehicles and owners have certificate of road worthiness that have expired. Drivers of these vehicles also have these lapses together with others such as absence of registration certificate, expired driving licenses, windscreen license,

transport licence amongst other (Table 3).

5. Outcomes and Challenges

Road accidents along the Douala-Yaounde National Road 3 have had many consequences on the population and nation at large. These are loss of human lives and property, freight damage, time wastage, and outcomes on income.

5.1. Loss of Human Lives and Property

Road traffic carnage and injuries along Yaounde and Douala and other national roads has placed a huge burden on families and the Cameroon economy at large. Many people have lost their lives and property. The active aged group that contributes to family upbringing and nation building have been lost. Many families in Cameroon have been pushed into poverty following the lost of the family heads and bread winners thus increasing the burden of care. In Cameroon road



Figure 10. (a) Heavily loaded trailers (T) transporting timber to Douala. The trucks have occupied the road leaving no passage for other vehicles. The narrowness of the road makes overtaking dangerous (Ojuku Tiafack, 2020); (b) wreckage of a truck that cause a fatal accident claiming several lives at the Sombo-Pouma stretch. Population, state officials and security agents on inspection mission (Ojuku Tiafack, 2019).

Table 3. Defaulters of official transport documents.

Document/Fault	N° of defaulters	%
Expired or absence of driving license	4	3.4
Expired Registration certificate (carte grise)	2	1.7
Faulty or expired insurance	21	17.6
Expired Windscreen license (Vignette)	3	2.5
Lack of Transport certificate (carte bleue)	19	15.9
Certificate of technical control service	26	21.8
Absence of Transport patent	12	10.1
Absence of Transport license	32	26.9
Total	119	100

Source: Fieldwork at Sombo, 2019.

accidents weigh on the economy following the lost estimated at 1 percent of the Gross Domestic Product [11]. This is not limited to Cameroon. In Africa, nearly 59,000 people lost their lives in road accidents in 1990 and these deaths were estimated to reach 144,000 by 2020 [20] [21] [22]. Accidents related to roads account for more than 85% of deaths in the world necessitating appropriate action to mitigate this enigma which continues to inflict unbearable damages on families, property and services. World Health Organisation forecasts a total of 1.8 million traffic deaths annually by 2030 [3].

Table 4 shows that the active population of Cameroon is mostly affected because they use the roads frequently. Within the age group 25 - 34, the number of lives lost (195) includes both males (55.4%) and females (44.6%). One also observes loss of lives (192), male (51.6%) and 48.4% for females within the age group 35 - 44 years. Deaths from these age groups constitute a great loss of labour force in Cameroon as is the situation in other African countries. In Tanzania for example, victims of road accidents have been mostly between the age bracket 24 and 34 years [13].

5.2. Freight Damage and Losses

Freight movement along the Douala-Yaounde National remains a thorny problem. Goods being shipped to other places through National Road 3 have been destroyed during accidents. Items such as petrol and petroleum products, manufactured goods and foodstuffs have often been destroyed by accidents leading to heavy financial losses. Accidents resulting to fall of tankers, commercial vans and

Table 4. Distribution of deaths and injuries by sex and age group.

Deaths/injuries			AGE GROUPS					Total	
			0 - 15	16 - 24	25 - 34	35 - 44	44+		
Deaths	Sex	Male	N°	76	82	108	99	67	432
			%	47.5	47.4	55.4	51.6	55	51.4
	Female	N°	84	91	87	93	55	410	
		%	52.5	52.6	44.6	48.4	45	48.6	
	Total	N°	160	173	195	192	122	842	
		%	100	100	100	100	100	100	
Injuries	Sex	Male	N°	103	111	149	128	115	606
			%	51	50.9	48.5	56.4	53	52
	Female	N°	99	107	158	99	102	565	
		%	49	49.1	51.5	43.6	47	48	
	Total	N°	202	218	307	227	217	1071	
		%	100	100	100	100	100	100	

Source: Pouma, Melong and Makenéné hospitals in-patient and out-patient Records 2004-2013.

trailers transporting manufactured goods are moments of celebration, pump, and pageantry to host communities. The local population steal undamaged items fallen from these vehicles for consumption and sale. This malpractice further inflicts losses on the goods owners and exposes the population involved into danger when the items are risky. This has been the case of vehicles transporting fuel, alcoholic drinks, drugs, chemicals and building material. The Nsam fire disaster of 14 February 1998 that led to lost of 200 lives in Cameroon was the result of these malpractices.

5.3. Circulation and Time Wastage

Time is wasted in traffic along National Road 3 due to the narrow nature of the road, congestion of vehicles, multi-security controls, poor weather conditions and accidents. The distance from Yaounde to Douala is 243 km. It takes an average of 4 hours driving at 60.75 km/h to cover this distance. Some drivers spend less or more time to cover this distance depending on the state of their vehicle. The narrow nature of the road, state of its surface, frequency of sharp bends, vegetation obstacles on some segments, frequency of accidents and surprise checks and control by road safety agents does not permit vehicles to run at their full capacity. Some vehicles especially buses transporting passengers have been coded to run below full capacity. This policy of limiting the speed of vehicle as accident preventive measures has damaged several vehicles not adapted to the road. Considering that the Douala-Yaounde National Road is narrow and lacks medians along most segments, sometimes more than an hour is wasted in traffic when an accident occurs.

The poor state of the road and frequent accidents have had negative implications on passengers travelling and their freight. Late delivery due to time lost in traffic slows down businesses. Saving time enables service providers travelling (administrators, educationists, and medical doctors...) to serve on time. Passengers travelling by road to border a flight, tourist on recreation trips, civil servants on professional mission, patients on medical appointments, researchers, teachers, and students travelling for studies and families on social mission suffer time loss and disappointments which cannot be measured in monetary terms. Arriving late at social events such as weddings, funerals, and burials due to long periods spent in heavy traffic along roads is frustrating. An efficient transport network saves time and time is money. Early arrivals lead to financial gains as they allow people to meet business appointments, workers to secure wages and salaries, and job seekers to attend interviews for employment and other opportunities. Delivering goods on time is a key factor in the supply chain. Very often populations plying the Yaounde-Douala National Road have been victims of these events and problems associated.

5.4. Revenue Production and Management

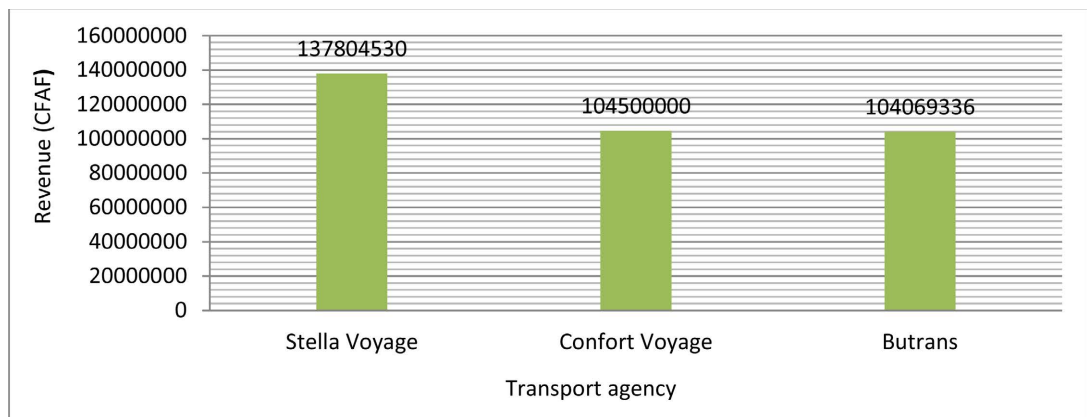
Road users and the administration of Cameroon generates much revenue from this

road. Traffic flow generates much revenue to agencies plying the Yaounde-Douala National Roads 3. This is seen on the ordinary fares paid by passengers and VIP Bus services operating on the Douala-Yaounde Road axis. The transport fare for an ordinary trip is 3000 to 3500 FCFA. The amount ranges from 5000 to 11,000 CFAF for Very Important Personality (VIP) services depending on the travelling agency. Finex Voyage that attracts several passengers due to its innovations offers round way tickets for 5000 CFAF, Garanti Express 11,000 FCFA, and General Express 10,000 CFAF plus bonus of a free ticket after possession of ten (10) tickets. They are considered VIPs for their customer services such as safety, punctuality, entertainment, snacks offered to clients, airconditioned buses. Ganranti Express alone generates close to 180 million FCFA along the Yaounde-Douala Road axis per year. Others such as Buca Voyages, Comfort, Linda and Butrans, Stella voyage also generate much revenue (Figure 11).

Unfortunately, most of the transport companies and services do not reinvest the income to improve on the quality of their services (drivers working condition, support staff, customer services, buses). This road has a very high traffic and mobility of economic goods, but the state of the road does not match with this flux. Income generated is not invested well to improve on the state of the roads. This neglect is a factor of high increase in human carnage, injuries and property lost.

Much revenue is generated by the state or Cameroon administration from toll gates and weighing stations. Every vehicle crossing the toll pays the sum of 500 FCFA. Unfortunately, disorder exists at the organisation of revenue collection. The collection of toll levies is not transparent as collectors are known for swindling [23]. Some drivers pay tollgate fees but do not collect their tickets. These tickets are resold by the collectors for personal gains. Collectors give priority to the sale of these tickets and pocket the money before normal duties. Such illegal practices lead to the loss of government revenue at tollgates.

The installation of automatic tollgates along the Douala-Yaounde Highway will save huge amounts of money from obligatory payments made at tollgates by



Source: AcaExpertise, 2013.

Figure 11. Revenue generated along the Douala-Yaounde National Road.

drivers and owners of private cars. Automated tollgates will allow road users to pay their royalties directly into the state treasury. Also, this technology will reduce the time lost in waiting during queues. These strategies of road transport disorder management are very successful in developed countries yet do not exist in many African countries [10].

6. Sustainable Options

6.1. Introduction of VIP Services

Face with the high volume of population and goods mobility and frequency of accidents the Very Important Personality (VIP) service has been introduced as recent indigenous solutions to improve on passenger comfort, freight safety and risk of accidents. This service is rendered by large travelling agencies such as Touristique voyage, Guaranti express, Finex, Buca Voyage, from Bertoua-Yaounde is not different. VIP Bus services along the Douala-Yaounde Road axis is about 5,000 CFAF especially with Finex Voyage, an agency which has carried out a lot of innovations to attract more passengers. A round away journey ticket along NR3 is 11,000 CFAF at Garanti Express while General Express levies 10,000 CFAF and having continuously bought ten (10) tickets and travelled, the customer is entitled to one (01) free ticket. This is also common with classic buses as a way of securing customer loyalty. VIP buses have the following characteristics: passenger ticket can be bought through the internet or by a telephone call, departure and arrival hours are strictly respected, buses are in good states with low risk of breakdown during the journey, candies are offered to passengers during the journey, passengers are comfortable as air condition systems and televisions have been installed, good communication services, agencies dutifully take responsibility for missing luggage, the drivers move respecting Highway code, and they are hardly stopped by traffic control officers for their regular road worthiness. These characteristics are quite different from those of classic especially ordinary buses which have unreliable services. Through the levying of fares, especially on classic passengers who dominate these roads, transport agencies generate huge incomes (Figure 7).

6.2. Douala-Yaounde Highway under Construction, Fallouts, and Challenges

It is faced with the upsurge in sore road carnage, injuries and property damage, that the Cameroon government has recently engaged in sharper policy to redress the enigma. This solution focuses on the construction of a highway connecting Douala and Yaounde. The government perceives this freeway as a panacea to this technological disaster that traditional solutions such as the sensitization of road users, use of sensor to track reckless driving and engineering has not redressed. The Douala-Yaounde Highway covers 196 km long. It passes through Lobo and Pan Makak in Lekie, Nyong and Kalle Divisions. The freeway has two segments. The first section stretches from Yaounde to Bibodi covering 60 km

long (Figure 12).

Figure 12 illustrates ongoing construction works along the first section of the Douala-Yaounde Highway. This road section has two outgoing and incoming carriageways, extendable to three, separated by medians. In order to make this section of the highway more accessible, access roads are being constructed. The first access road is 10 km, stretching from Minkoameyos in Yaounde along National Road 3 to the highway. The second access road (13 km) stretches from Bibodi to Boumnyebel along National Road 3. At Bibodi, the terminal from Boumnyebel, there is an interchange to regulate traffic flowing onto the highway. The construction of the first section of the Douala-Yaounde Highway is incomplete as works are still going on. The project, worth 338,770 billion CFAF is financed by the Export-Import Bank of China (80%) and the government of Cameroon (15%). The highway is executed by the China First Highway Engineering Company (FHEC) and supervised by Groupement SCET Tunisie and Louis Berger.

The second section of the Douala-Yaounde highway WERW stretches from Bibodi to Douala covering 136 km long. It has two segments with the first connecting Bibodi and Edea (70 km) and the second stretch from Edea to Douala (66 km) from where it is linked to National Road 3. The Bibodi-Douala segment is expected to have five (05) interchanges located at Bodmon, Edea, Logbadjeck, Dibamba beach and Douala. The project also envisages the construction of a



Source: MINTP, 2015/2018.

Figure 12. Partial views of construction works at the Yaounde-Bibodi segment. (a) Construction of lanes and a median along the Yaounde-Bibodi road section; (b) crossroad along the Yaounde-Bibodi road section; (c) and (d) woodlands, habitats and terracing works along the Yaounde-Bibodi road.

bridge of 250 m in length, over River Dibamba, and 500 m over River Sanaga. The Bibodi-Douala Road section will have a reference speed of 90 km/h, two outgoing and incoming carriageways which are extendable to three in future. The two carriageways have dimensions of 7.50 m wide with each lane having 3.5 m. The carriageways will be separated by medians of 9 m. As per the subsequent enlargement of the highway, the third lane will be constructed along the outgoing and incoming carriageways, 2.75 m wide, comprising a median with a width of 2 m. Provision has also been made for the construction of two emergency lanes of 3 m each. This section of the highway shall also be connected to National Road 3 through one-way access roads of 7 m, each lane 3.5 m.

Findings reveal that approximately 76.6% of road users against close to 23.4% are of the opinion that the construction of the Douala-Yaounde Highway would come with several opportunities such as traffic decongestion and reduce road accidents along the existing National Road 3, increase traffic flow between Yaounde and Douala and the Kribi and Limbe Deep seaports, the Central Africa Sub-region and countries connected to the Trans-African Highway [24]. Facilitate safe transportation of goods for export and the redistribution of imported items. The highway is also expected to reduce the corrupt practices observed at tollgates along National Road 3 as it will have electronic tolls that eliminate possibilities for human contact and manual collection of revenue.

This road like other development projects in Cameroon has faced many political stakes. Initially it was referred to as the Douala-Yaounde Highway but later became Yaounde-Douala due to political infiltrations from the ruling elite willing to benefit first from the road. Secondly, the road budgeted at 339 billion FCFA was to cover 60 kms in phase one starting from 2014. This budget according to the world Bank cost four times the amount for similar roads in other African countries. The budget further went up to 424 billion FCFA for the same distance of 60 kms. In the year 2022 (8 years), works initially programmed for 4 years are yet to finish. A road planned to connect Douala-Edea is still at the mid forest zone. 204 billion FCFA is still expected for the highway to connect the road to the Yaounde-Douala axis under this study. By implication the road will finally cost 628 billion FCFA.

6.3. Hybride Technical Options

At the global scale, vehicle designers and manufacturers should rethink on the future models of vehicles fabricated. This future generation of vehicles should be equipped with sensors that automatically detect reckless situations on users (drivers and passengers) such as their alcoholic levels and phone distractions. This life saving innovations will help reduce error margins that lead to traffic fatalities and injuries [25]. The impact of the air back innovation integration in car manufacturing on road accident reduction has been huge.

7. Discussion

The Significance of the Yaounde-Douala National Road 3 is important. The Yao-

unde-Douala National Road does not only connect the economic and political capitals of Cameroon. It links the Douala, Limbe and Kribi seaports facilitating the exportation or importation of goods and distribution to other regional capitals (Ebolowa, Bertoua, Bafoussam, Bamenda, Garoua, Maroua and Ngaoundere) of Cameroon and countries like Tchad, Central African Republic, Congo in the CEMAC Region [24]. Freight from the regional headquarters is easily shipped to these seaports for exportation while goods imported from the ports are distributed through the road. Douala handles more than 95% of the freight in Cameroon which have to be transported through this dangerous road. The transport volume has witnessed an exponentially growth, almost doubling within a decade. It shows the importance of this road and the need to put in place high bride solutions to cutdown the bulk and burden of accidents recorded on daily basis.

Road traffic accidents are seen to be a major health concern in Cameroon and many African countries [12] and the world at large [22] [26] [27]. According to the Ministry of Transport of Cameroon (2012), between 2002 and 2009, about 88,717 corporal accidents involving 15,000 deaths with 2791 cases of material loss were recorded along national roads in Cameroon. In Ghana, about 8 deaths and injuries were reported in July 2021, necessitating strategies to mitigate it such as sensitization, enforcement, and engineering works [28]. In Cameroon the use of reactive measures such as tracking of reckless driving using radar technology rather than proactive stands is largely defective as a solution. Periodic arrest and punishment in the last two decades have not stamped out the enigma along the Douala-Yaounde National Road amongst others. It has rather opened up corruption networks to buy their way when tracked, multiplied the number of dangerous trips and overloading to recover moneys lost through bribery and corruption and low wages (Field work, 2022, [29]). These neo-practices rather aggravate than solves the problem of road accidents. The 2022 African cup of nations recently hosted by Cameroon gave the opportunity to carry out engineering works along these roads that have contributed to improve road safety. If options such as rethinking about other transport modes and diversification to decongest the roads through reduction of number of private vehicles are not possible, collective transport should be reinforced.

In the era of decentralisation in Cameroon, the transport sector has to be reformed through reduced travels to Yaounde and Douala where all state services are concentrated. This will reduce public and private mobility for services that exposes the population (**Figure 3**) in small and medium size towns for services located in Yaounde and Douala. This will greatly improve on the transport system.

Road users must be prudent in their driving behaviour. Both drivers and passengers have been accused of their attitude and unprofessional behaviour during driving, drivers run at excessive speed to make for trips for income enhancement. Passengers encourage drivers to run at excessive speed to gain time. These malpractices contribute to production of accidents with negative outcomes in our society. It is for this reason that in efforts to stamp out this behaviour one

person draws the attention of drivers about excessive speed through this message:

“At 60 km/h ‘it is well with my soul’, At 80 km/h ‘God will take care of us’, At 100 km/h ‘Guide me oh God to Thee’, At 120 km/h ‘Nearer My God to Thee’, At 140 Km/h ‘This world is not my home’, At 160 km/h ‘Lord, I am coming home’, At 180 km/h ‘I fly away...’, At 200 km/h ‘I have decided to follow Jesus’, At 220 km/h ‘Take my life’”

Source: social media, 2022.

8. Conclusion

Road accidents between Douala and Yaounde are high and responsible for the leading causes of death in Cameroon national roads. Field evidence suggests that this road is the busiest in Cameroon as it links Yaounde the political capital and Douala the economic hub of Cameroon and the CEMAC region [24]. Accidents are caused by reckless driving, poor state of vehicles and the road. Unfortunately, greater responsibility has been attributed to road users. The nature of the road is not adapted to the traffic flow along it and public measures put in place to curb accidents have been more reactive than proactive. Until the road is modernized and adapted to the current freeway under construction, and alternative modes of transports linking the two primate cities developed at affordable prices, road accidents will continue to pose a threat to humanity and development of Cameroon’s economy. The Yaounde Douala highway under construction is an option to curb road accidents but the government has to equip them with road safety education programmes, awareness campaigns, drunk driving laws, infrastructure and road maintenance packages, installation of intelligent traffic lights, red-light Cameras, speed cameras, reinforce periodic vehicles and drivers’ inspection. Experiences in Latin America have shown the success of these policies in road accident mitigation even though with difficulties [30]. Development and modernisation of alternative modes of transportation at affordable rates to the population will be a proactive solution and gateway to this enigma faced by populations along the Cameroon National roads.

Conflicts of Interest

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

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