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Typology and Risk Factors of Public Road Accidents in Kinshasa with Its Two Peripheral Areas (Mongata and Kasangulu) from March to May 2017

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Abstract

Introduction: Road traffic put people at risks and needs health education to avoid accidents and deaths. This article aimed to build up a typology of public road accidents (public road accidents) and risk factors associated with in the provincial city of Kinshasa and its peripheral cities (Kasangulu and Mongata), to identify the profiles of the vehicles and people involved in these public road accidents. **Method:** We conducted a prospective eco-analytical study on a stratified random sample whose size was determined by the Fischer formula. **Results:** Overall, from March to May 2017, we witnessed an incidence of public road accidents cases ranging from 139 public road accidents cases in the city province of Kinshasa and its two peripheral areas: road axes of high concentration: Rte Blvd Lumumba-Airport; Rte Poids Lourd-Pont Matete, the axes of medium concentration: Rte N21-IMBU, Rte Blvd 30 juin-socimat; Rte Matadi-Kasangulu toll; Rte Université-Intendance, Rte By Pass-triangle Maman Mobutu-Kintambo (Rte-Matadi)-Toll/lère virage-Triangle Maman Mobutu and those of low concentration were: Rte du tourisme/Mimoza-Mbudi; Rte Matadi-Terrain Siwabanza. **Conclusion:** In these areas, public road accidents are a real public health problem that deserves sustained attention from all and especially from decision makers. Interventions must concern the HVE accident complex.

Keywords

Typology, Risk Factors, Public Road, Accidents

1. Introduction

With road traffic, risks happen with the need to travel, to go to work, to school, or for leisure. This is how one becomes a road user, and then the deadly road [1]. Every year 1.3 million people are killed on the roadwith more than 3000 people killed every day. In addition to these fatalities, there are 140,000 injured people, 15,000 of whom will remain disabled for life. Almost three quarters (73%) of those killed on the roads are men. Among young drivers, young men under 25 years of age are nearly 3 times more likely to be killed in a car accident than young women. More than 90% of road fatalities occur in low- and middle-income countries, and among these countries, the African Region and the WHO Eastern Mediterranean Region have the highest death rates [2].

In the Democratic Republic of Congo, a vast country south from Sahara (2 345,000 km^2), the road transportation network no longer provides the economic sectors with the infrastructure and services that promote trade of all kinds and improve the mobility of people and goods. This deficiency constitutes a major obstacle to economic development, hinders commercial exchanges, and restricts the access of populations to basic social services. There are no official figures in the Democratic Republic of Congo that correlate road deaths with social background, although this link does exist [3].

In recent years, there has been a significant increase in the number of car accidents in Kinshasa, and their corollary, road accidents. Hardly a day goes by without the media reporting cases of road accidents, without morgues recording deaths due to public road accidents, without families burying their loved ones because of road accidents [4].

The anarchy observed on the roads of Kinshasa poses a serious safety problem. On the one hand, public transportation drivers flagrantly violate the driving code with impunity, thus endangering other road users. On the other hand, it is the processions of officials who, instead of leading by example, behave like true outlaws [2] [5].

Luc Boltyearski, "Les usages sociaux de l'automobile: …", observed in 1975, when an average of 15,000 people lost their lives each year on the roads of Kinshasa. What is the situation 35 years later, when in 2009 there were 4262 deaths and at the same time the number of vehicles on the road and the distances covered have not stopped increasing [6]?

The discourse of the State services convinces us that the responsibility for the accident is the personal fault of the driver. The road accidents would result from the differences of individual aptitudes to the driving and would be distributed in a random way [7] [8]. An opinion not shared by a good number of the knights in the field.

The question is whether an improvement in this respect alone would contribute to prevention and avoid the user having to make a mistake. As long as we don't see things differently, as long as we don't have another look, the interventions in favor of the road safety will only aim at the action of the man to finally

come up against many obstacles as KOLTZON underlined.

In order to solve this paradox of a social problem which is not perceived as such by the individual, it is absolutely necessary to realize that the extent and the nature of the problem require a description as complete as possible, *i.e.* to analyze the risks separately: the road user, the vehicle and the traffic conditions or the environment, the accident subjects (man-vehicles-environnement). It is the imbalance observed in this accident triad that leads to the accident.

The prevention measures must address all three because their respective effects combine; let's take the common case of the vehicle that skids and collides with another vehicle, a tree, a wall; it is imperative to understand that, if the driver (user) had approached the stretch of road where the accident occurred at a lower speed, the dangerous skid could have been avoided. On the other hand, if the car (vehicle) had been equipped with better tires and brakes or if the road had a non-slip surface, the accident might not have occurred.

In sum, road traffic accidents in this city are a major but neglected public health problem, with serious consequences in terms of mortality and morbidity and considerable social and economic costs in the absence of effective and sustainable measures.

In view of preceding problem, we asked ourselves the following fundamental question: what are the factors that involve the occurrence of public road accidents (persons-vehicles-environnement) in the city of Kinshasa and its surroundings? The answer from this question will help us to describe the principal causes of public road accidents (PRA) and identify risks factors so that we highlight the typology of public road accidents in the above cities.

2. Material and Methods

2.1. Material

This study is conducted in Kinshasa with its two surrounding areas which are Mongata and Kasangulu as shown by the following map. Kinshasa, called Leopoldville from 1881 to 1966, is the capital and largest city of the Democratic Republic of the Congo (DRC). The heart of all institutions and politics with an estimated population for the year 2016 of 12,071,000 inhabitants on an area of 9965 km^2 and the density of 1211 inhabitants/km^2, it is the third most populous city in Africa after Cairo and Lagos and one of the most populous agglomerations in the world. Located on the southern bank of the Congo River, at the Malebo Pool, it faces the capital of the Republic of the Congo, Brazzaville.

The city limits are very large, and more than 90% of its area is rural or forested (especially in the commune of Maluku); the urbanized parts are located in the west of the territory. Kinshasa has the administrative status of a city and is one of the country's 26 provinces. Its inhabitants are called Kinois.

The site of Kinshasa has been occupied for several centuries by Bantu peoples (Teke, Humbu) and became a commercial center during the 18th and 19th centuries. In 1881, the explorer Henry Morton Stanley named the city Leopoldville

in honor of the Belgian king Leopold II.

In 1920, it had only 1600 inhabitants, and its population gradually increased until it reached 200,000 inhabitants in 1950. During the second half of the 20th century, the city experienced strong economic development and anarchic urbanization: from one million inhabitants in 1970 to 12,071,000 inhabitants today.

The main artery of the city is the Boulevard du 30 juin, linking Kintambo, the first European settlement in the city, and the commune of Kinshasa, the current business district located 5 km to the east. From Kintambo, a road climbs quickly up the hills of the commune of Ngaliema, a road goes south-east, under the name of Lumumba Boulevard, and then eastwards towards the Kwango and the center of the country, passing through the communes of N'sele and Maiuku. **Figure 1** shows the city of Kinshasa some of its routes.

Two important arteries connect these two exit routes from the city: Pierre Mulele Avenue, starting from Boulevard du 30 juin and joining the Matadi road at the level of Ngaliema, and University Avenue, starting from Limete, passing by Mont Amba, the University of Kinshasa and Mont Ngafula to join the Matadi road at the southern limit of the city, thus forming an informal ring road.

In fact, the urban area occupies only the western part of the province, the southern part of the communes of the hill area remaining rural in places and the eastern communes of the province of N'sele and Maiuku, being entirely or partially rural, Maiuku alone occupies 79% of the territory of the province.

The only road is the road that leaves Kinshasa towards the east in the direction of Kwango, with a branch road towards the north to reach the town of

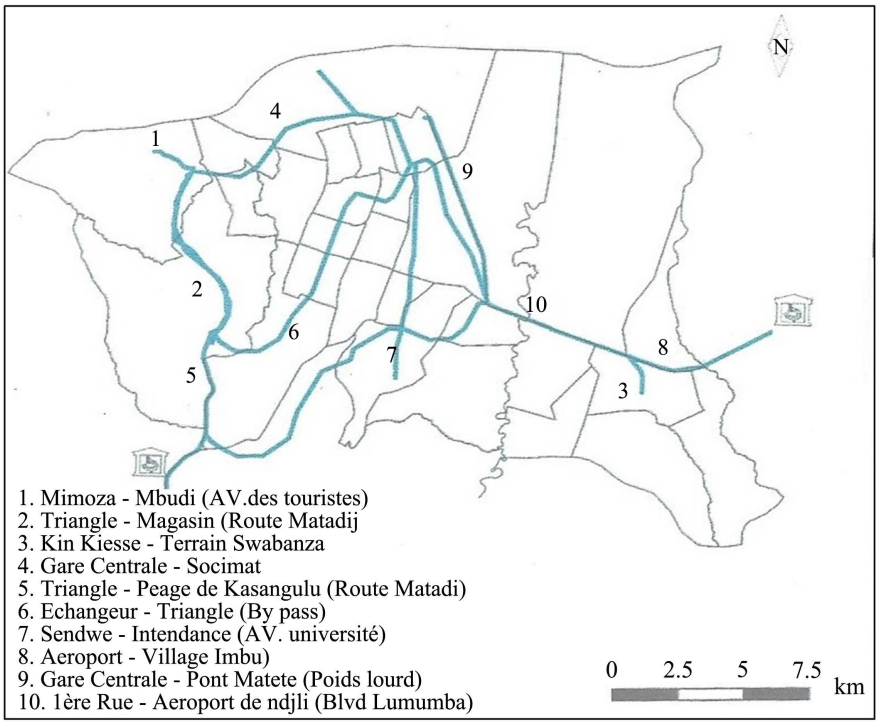

Figure 1. Presentation of the study area.

Maluku at the entrance to the Malebo pool. It is located in the west of the country between 3.9 and 5.1 degrees south latitude and between 15.2 and 16.6 degrees east longitude. It is the most motorized city in the country with a vehicle fleet of 679,000 registered vehicles on a 274 km road network that is in a lamentable state of deterioration. It is the city with the highest mortality and morbidity rates from public road accidents in the country.

2.2. Method

2.2.1. Type of Study and Sampling

We conducted a prospective, analytic ecological study with stratified random sampling and a size determined by Fisher's formula:

$$Z^2 \cdot Q/d^2 = 1.96^2 \times 0.5(1-0.5)/0.05^2 = 3.84 \times 0.25/0.0025 = 384 \quad \text{(sample size)}$$

2.2.2. Data Collection

Before proceeding to the actual collection, our instruments were submitted to a pre-test (pivotal survey) in order to reassure us if they could measure what they were supposed to measure; which instruments were drafted with the help of our personal experience and the support of the literature review and of the public and private services in charge of road safety.

We collected the data from the accident observation points with a structured data collection form using the observation technique on the one hand; and the data from the driver survey were collected with a written and structured questionnaire using the face to face interview technique on the other hand. All these data were collected on the basis of two statistical units (axes and drivers).

The GPS data was taken on the different axes of the observation points using a GPS map62st of CARMIN brand, as well as the images on Ikonos background, allowed us to digitize our roads and to section them.

The collection of data from the road network consisted in the research of the variables of interest as: fixed and mobile radars, alcohol tests, fixed stations of automatic weighing, device of road restraint, of vehicles, and pedestrians, road signs, marking on the ground as well as the cameras of surveillance of speed, presence or absence of the qualified agents.

Active prevention data in the vehicles involved in the public road accidents consisted in the research of variables of interest such as: brakes and tires in good condition, turn signals, front and rear position lights, anti-lock braking system, anti-collision sensor, headlights, brake lights, the last technical control certificate.

2.2.3. Data Collection Plan

At the level of the province and two peripheral zones, a subdivision in observation points, axes, pools and coordination was set up and with our research certificate delivered by the faculty, we were able to obtain authorizations from the services concerned by our research among others: the National Road Safety Commission (NRSC) and the TRAFFIC POLICE.

2.2.4. Data Processing

The data from the structured form and the questionnaire were entered and encoded on Excel and Epi info software for the constitution of the database. These two databases were imported in csv-tabulation form into SPSS and R software for the analyses. Our results will be in the form of tables and graphs and thematic maps. We will use descriptive statistical techniques for absolute and relative frequency measures (%), the Ratio and finally build appropriate graphs to visualize trends or variations at the axis level. Inferential statistical techniques (multivariate analysis) will help us to build our mathematical model.

3. Results

3.1. Simple Analysis

3.1.1. Incidence of Public Road Accidents Cases Range

From March to May 2017, the incidence of public road accidents cases ranging to 139 cases in the city province of Kinshasa with its two peripheral areas, 259 deaths, 44 serious injuries and 17 light injuries. Roads with high concentrations were: Boulvard Lumumba-Airport; poids lourd-Pont Matete. Roads of medium concentration were: NI-IMBU; Boulvard 30 juin-Socimat; Matadi-Péage Kasangulu; Université-Intendance; Bypass-Triangle Maman Mobutu-kintambo (Rte Matadi)-peage/virage-Triangle Maman Mobutu. Those of low concentration were: Rte du tourisme/Mimoza-Mbudi; Rte Matadi/ler Virage—Commune de Mont Ngafula; Rte Mokali—Terrain Siwabanza and Rte Matadi as shown on Figure 2.

It is clear from this figure that the Boulvard Lumumba-NDJILI-Airport and Poids Lourds-Matete Bridge axes were highly concentrated than others. The following Tables 1-6 give information on factors related to transportation and the typology.

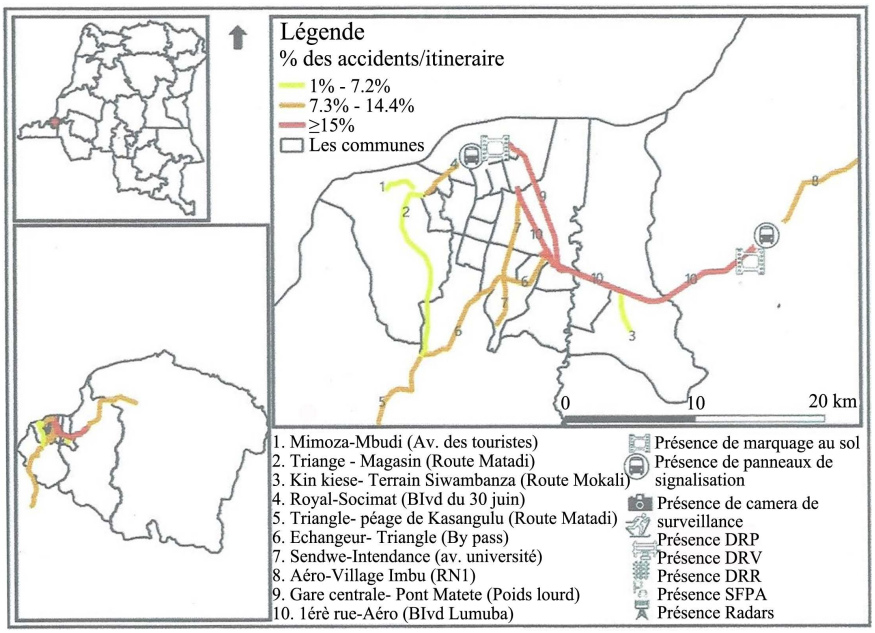

Figure 2. Distribution of public road accidents by axis.

Table 1. Distribution of public road accidents according to the main causes.

N°	Main causes	N	%
1	Roads and alleys are deteriorated	61	15.9
2	Driver impatience.	50	13
3	Learning to drive	61	15.9
	Drivers		
4	Drunkenness + telephone while driving	11	2.9
5	Vehicles incompatible with the Congolese driving code	89	23.2
6	Excessive speed.	112	72.1
	Total	**384**	**100**

Table 2. Distribution according to the profiles of the people involved in the public road accidents.

Profile of the people involved	Frequency (384)	Percentage (%)
Schoolchildren	30	7.8
Trolley drivers	50	13.1
Motorcycle drivers	68	17.7
Vehicle drivers	77	20.1
Pedestrian	84	21.8
Qualified agents	75	19.5

Table 3. Distribution of vehicles according to their degrees of involvement in the public road accidents, coupled with their safety services.

N°	Types of cars	Frequency (n = 139)	%	Breaks (+/−)	Wheel lock system (+/−)	Anti-collision detector (+/−)	CCT (+/−)	AFL (+/−)	Headlights Stop (+/−)
1.	Commercial Vehicles (207/esprit de mort)	52	37.4	−	−	−	−	−	−
2.	Jeep/Private	4	2.9	+	−	−	+	−	+
3.	Commercial Vehicles (trailer)	2	1.4	+	−	−	−	−	−
4.	TRANSCO Bus	9	6.5	+	−	−	−	−	−
5.	“Esprit de vie” Bus	27	19.4	−	−	−	−	−	−
6.	Commercial taxi (ketch)	45	32.4	−	−	−	−	−	−

Table 4. Distribution of respondents according to socio-demographic, cultural and health profile.

Variables	Frequency (384)	Percentage
Age		
Less than 15 years.	5	1.3
15 -24 years	203	52.9
25 - 34 years	80	20.8
35 - 44 years	50	9.9
45 - 54 years	35	5.7
55 - 64 years	7	1.8
>65 years		8.9
Sex		
Male	325	84.6
Female	59	15.4
Marital Status		
Married	94	24,5
Single	290	75.5
Education level		
No level	121	31.5
Primary	72	18.8
Secondary	146	38.0
University		11.7
Occupation		
No occupation	279	72.7
Government employee	73	19.0
Civil servant in the private sector	18	4.7
Tradesman	14	3.6
Religion		
None	98	25.5
Christian	160	41.7
Muslim	76	19.8
Revival Church	50	13.0

Table 5. Factors related to driving.

Variable	Frequency (384)	%
Training in driving		
Yes	168	43.8
No	216	56.2

Continued

Have a license		
Yes	181	47.1
No	203	52.9
Type of vehicle driven		
Commercial vehicle	240	62.5
Vehicle used for personal transportation	144	37.5
Having already an accident		
Yes	239	62.2
No	145	37.8

Table 6. Relationship between sociodemographic profiles and the occurrence of a traffic accident (public road accidents).

variables Public road accidents IC 95%									
	YES	NO	OR	BI	BS	X^2	Ddl	p	S
1. Age	n = 239	n = 145							
15 - 24	145	58							
Less than 15 and more than 24 years	94	87	2.314	1.518	3.527	15.473[a]	1	0.0001	***
2. Sex									
Male	198	127							
Female	41	18	0.684	0.377	1.244	1.560[a]	1	0.212	NS
3. Marital status									
Single	186	104							
Married	53	41	1.384	0.862	2.220	1.817[a]	1	0.178	NS
4. Level of education									
No level, primary and secondary	133	60							
	106	85	1.778	1.171	2.699	7.350[a]	1	0.007	NS
5. Occupation *No occupation and others*	195	84							
	44	61	3.218	2.023	5.121	25.427[a]	1	0.0001	NS

3.1.2. Main Causes of Public Road Accidents

Table 1 shows that speeding was the main cause (29.2%), followed by incompatible vehicles (23.2%), deteriorated roads and lanes coupled with learning (15.9%) and impatience of drivers + drunkenness and phone calls at the wheel which end the list.

It is shown in Table 2 that pedestrians were the most involved (21.8%), followed by drivers of vehicles (20.1%) and qualified agents (19.5%) and motor-

cycle drivers (17.7%). School children and trolley drivers were the least involved (7.8%) and trolley drivers (13.1%).

3.1.3. Most Involved Vehicles in Accidents

From Table 3, Trucks 207 (esprit de vie) were strongly involved to the public road accidents (37.4%), followed by "Ketch" (32.4%) and "esprit de vie" (19.4%). It also emerged that apart from the "jeeps" which were somewhat passable with accident prevention device, the other vehicles have no accident prevention device. Figure 3 helps to identify the average of deaths caused by vehicles.

3.1.4. Average Number of Fatalities Per Vehicle Involved

It emerges from this mustache box, 207 trucks, ketchs and spirit of life have killed too many than other vehicles.

3.1.5. Risk Factors of the Main Causes of the Public Road Accidents

Table 4 shows that the most represented age range is 15 - 24 years old (52.9%), followed by 25 - 34 years old (20.8%) and the age range less than 15 years (1.8%); the most represented gender was male (84.6%). Single people were more represented than married people (75.5%); the secondary level was the most representative (38.0%), followed by the no level (31.5%); the most represented professional category was that of no profession (72.7%); the majority public road accidents cited the Christian religion (41.7%).

3.1.6. Accidents from Training in Driving

Table 5 shows the following: 56.2% of vehicle drivers have not had any training in driving (43.8%); drivers without a license (52.9%); drivers of commercial vehicles (62.5%), drivers of private vehicles (37.5%); having already had accidents (62.2%).

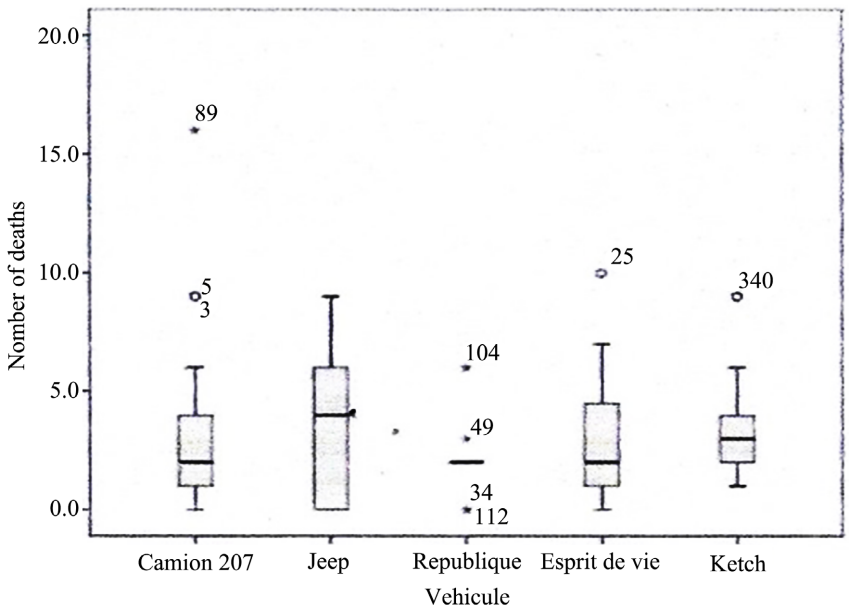

Figure 3. Devices involved according to the averages of the killed.

3.2. Associative Variables

Table 6 of the associative analysis shows the following: the relationship between the age groups of 15 - 24 and 25 - 34 years is very significant statistically to the occurrence of road accidents with X^2 = 15.473 ddl of 1 and p-value of 0.0001; the relationship between the level of education is also statistically significant to the occurrence of accidents with X^2 = 7.350 ddl of 1 and p-value of 0.007; the occupation also establishes a statistically very significant relationship with an X^2 = 25.427 ddl of 1 and p-value of 0.0001.

Table 7 shows that the relationship between the absence of driver training and the occurrence of road accidents is statistically very significant with a X^2 = 22.668, ddl = 1 and p-value = 0.0001; the relationship between the absence of a driving license and the occurrence of road accidents is also statistically very significant with a X^2 = 28.568 ddl = 1 p-value of 0.0001. Table 8 helps to highlights the importance of factors involved in accidents.

3.3. Multivariate Analysis

The risk factors most associated with road traffic accidents are the following depending on the importance of OR: lack of occupation: (OR = 4.53, 95% CI [2.06 - 9.91], p = 0.0002), commercial vehicle: (OR = 3.99, 95% CI [2.42 - 6.57], p = 0.0001), lack of license: (OR = 2.83, 95% CI [1.2 - 6.7], p = 0.01), the age range from 15 to 24 years: (OR = 2.7, 95% CI [1.5 - 5.0], p = 0.0012).

Table 7. Relation between variables related to driving and the occurrence of road accidents.

variables Public road accident CI 95%									
	YES	NON	OR	BI	BS	X^2	Ddl	p	S
1. Lack of training	n = 239	n = 145							
Yes	127	41							
No	112	104	2.876	1.849	4.474	22.668[a]	1	0.0001	***
2. Lack of a driver's license									
Yes	138	43							
No	101	102	3.241	2.089	5.028	28.568[a]	1	0.0001	***
3. Vehicle involved									
"*Esprit de mort*", *Ketch and goods*, *Esprit de vie*, *TRANSCO*	137	77							
	102	68	1.186	0.783	1.796	0.651[a]	1	0.420	NS
4. No awareness of traffic regulations									
Yes	119	68							
No	120	77	1.123	0.743	1.697	0.303[a]	1	0.582	NS

Table 8. Unconditional logistic regression.

Terms	Odds Ratio	95%	CL	Coefficient	S. E.	Z-Statistique	P value
Age (15 - 24)	2.7594	1.4951	5.0927	1.0150	0.3127	3.2463	0.0012
Vehicles	1.1272	0.6917	1.8369	0.1197	0.2492	0.4805	0.6308
Marital status	0.2532	0.1022	0.6274	−1.3736	0.4630	−2.9670	0.0030
Lack of training	1.3993	0.5910	3.3133	0.3360	0.4398	0.7639	0.4449
Lack of Sensitisition	0.8081	0.4898	1.3333	−0.2131	0.2555	−0.8341	0.4042
Education level (*No level* and primary)	1.0095	0.5818	1.7516	0.0095	0.2812	0.0337	0.9732
No license	2.8335	1.1982	6.7006	1.0415	0.4391	2.3717	0.0177
No Occupation	4.5313	2.0694	9.9221	1.5110	0.3999	3.7786	0.0002
Sex (Male)	0.5768	0.2836	1.1732	−0.5502	0.3622	−1.5190	0.1288
Type of vehicule	3.9964	2.4283	6.5771	1.3854	0.2542	5.4502	0.0000
Driving							
Constant	*	*	*	−0.9721	0.4658	−2.0868	0.0369

3.4. Typology

Table 9 shows the predominance of vehicle and. pedestrian accidents (40%), followed by head-on collisions (26%) and collisions between vehicles and objects on the side of the road (20%). The other types of accidents were less represented.

4. Discussion

From the overall results, axes of high, medium, and low concentration of public road accidents emerged. The BLVD LUM-Ndjili-Airport axis and the heavy goods vehicle-Matete Bridge axis are considered to be the axes with the highest concentration of public road accidents. The situation is explained by the absence of real land use planning and the density of traffic. Boulevard Lumumba is a main artery that connects the Ndjili airport with the city center and also serves the Tshangu district, an area with a high population concentration. The RN1 national road also provides access to the provinces of Bandundu and the two Kasai. Thus, it is the only access road to the main supply centers of Kinshasa. Residential, commercial and industrial activities will develop in an anarchic manner coupled with road traffic concentrated on certain arteries. The results of previous studies support this [9] [10].

In terms of causes, the speeding is the main cause (29.2%), followed by incompatible vehicles (23.2%), deteriorated roads and lanes coupled with learning on public roads (15.9%) and impatience of drivers, drunkenness and phone calls while driving ended the list. It is probably a matter of heavy traffic coupled with

Table 9. Distribution of public road accidents by crash type.

TYPOLOGY	DESCRIPTION	%
Pedestrian vehicle Collision	Collision between vehicles and Pedestrian	40
Collision Vehicle-Vehicle Frontal	Collision between vehicles (frontal)	26
Collision V-Object	Collision between vehicles and an object at roadside	20
Collision V-V in Y	Collision between vehicles in opposite directions at the intersection and emerge in the same direction left or right	3
Collision V-V in T	Collision between two vehicles at an intersection, one of which is horizontal and the other vertical	4
Collision V-V in park	Collision between two vehicles, one of which is parked	4
Collision V-M	Collision between vehicle and motorcycle	3

non-compliance with traffic regulations. An accident never has a single cause. The results of a similar study on road failures in 2005 by Gauthier are superimposed on our results [11].

The graph shows that pedestrians were the most involved, followed by drivers and skilled workers. It is likely that heavy traffic will pass through residential areas, where vehicles can travel at very high speeds will pass pedestrians, and that heavy trucks traveling long distances will use routes that have not been designed for them. The risk of being injured in road accidents will therefore be high for car occupants and even higher for vulnerable road users, such as pedestrians, cyclists and motorcycle users [12].

In these collisions, our study revealed the vehicles with the greatest involvement in public road accidents: commercial vehicles such as the Mercedes 207 "spirit of death", followed by commercial vehicles such as "Ketch". This involvement is related to the increase in the number of cars in the city and province of Kinshasa on an unchanging road network. The proliferation of ketch cabs that are not compatible with the Congolese driving code exposes drivers to a difficulty of overtaking and are negative public road accidents. The spirits of death are old vehicles with negative public road accidents responsible for the commercial activity at the city level. There was a moderate involvement in public road accidents of the commercial vehicle (spirit of life) and other vehicles such as commercial trailers, private jeeps and TRANSCO buses had a low involvement in public road accidents. This is due to the number of these vehicles in traffic. Apart from the jeeps, the other vehicles had negative accident prevention devices in the vehicle [2].

Table 1 shows that the most represented age group is 15 - 24 years old (52.9%), followed by 25 - 34 years old (20.8%). This could be explained by the difference in the number of people in these age groups compared to the other age groups

on the one hand, and on the other hand by the fact that many young people are ambitious, curious and enthusiastic, and they take any risk. A similar study was carried out in 2001 in Toulouse, France, by Torres and Gauthier and the results are similar to ours [3].

In our study, we also noted a predominance of males involved in public road accidents during the period from March to May, 84.6% of the drivers of the various vehicles. This could be explained by the difference in the number of male and female drivers, but also by the risk behaviour of men driving compared to women. These results support the male predominance found in the Democratic Republic of Congo (82.5%) in a similar study on the Kinshasa-Kimpesse axis by Claude Nkula KIBAZOLA in 2005 [8].

Table 6 of the associative analysis shows that age, education and lack of occupation are correlated with public road accidents. This could be explained by the fact that the younger one is, with a low level of education, the less likely one is to have a job and the more tired one is of being unemployed, the more likely one is to take the risk of becoming a driver of a commercial vehicle, and this can only influence the accidents [2].

Table 7 shows that the relationship between the absence of driver training and the occurrence of road accidents is statistically very significant with an X^2 = 22.668 ddl = 1 and p-value = 0.0001; the relationship between the absence of a driver's license and the occurrence of road accidents is also statistically very significant with an X^2 = 28.568 ddl = l p-value of 0.0001. This could be explained by the lack of experience with the ignorance of the traffic code that must correlate with the occurrence of accidents [l] because the license is the material proof of the skill and the training gives the driver the consequent behavior.

The risk factors most associated with road traffic accidents are the following according to the importance of OR; lack of occupation: (OR = 4.53, CI 95% [2.06 - 9.91], p = 0.0002) = the risk is more in drivers who only have driving as their occupation; commercial vehicle: (OR = 3.99, CI 95% [2.42 - 6.57], p = 0.0001) → risk is higher among drivers of commercial vehicles; lack of license: (OR = 2.83, CI 95% [1.2 - 6.7], p = 0.01) = the risk is more among those (drivers) who do not have a National Driving License; age group 15 - 24: (OR = 2.7, 95% CI [1.5 - 5.0], p = 0.0012) = risk is higher among young drivers aged 15 - 24.

In relation to the types of accidents, our survey revealed front-end collisions, rear-end collisions, head-on collisions, side collisions (T), Y-shaped collisions, collisions between people and motorcycles, and even skidding. This situation is the consequence of an unplanned transportation system in the face of heavy traffic, impatience on the part of the drivers and ignorance of the traffic regulations. The streets and alleys, despite their lamentable state of hopeless and negative public road accidents, welcome users of roads (vehicles, Pedestrians, motorcycles, trolley drivers, the blind, the foolish, animals) on the same roadways and should be unaware of the road code [13].

Limitations:

This study concerned only accidents that were recorded in data coordination

center (the TRAFFIC POLICE Office). Some accidents could not be noticed by the police because some drivers can reach an amicable settlement. However, these unreported accidents cannot affect the results of this study.

5. Conclusion and Perspectives

This prospective eco-analytical study on the typology and risk factors of road accidents in Kinshasa and its surroundings has allowed us to note the different risk factors associated with public road accidents on the one hand and the diversified character of its typology on the other. The unplanned transportation profile is due to the proliferation of the vehicles as a result of the "credit-vehicle contract" phenomenon on an unchanging road network.

Despite combined efforts at the country level to reduce public road accidents rates by 2022, the curve remains upward. Public road accidents remain a real public health problem in Kinshasa and its surroundings that deserves the attention of all and especially of decision makers. Interventions must be oriented towards the accidentogenic complex according to Haddon's scheme by rejecting the inescapable, impregnable character of accidents, by a theoretical assimilation of these to infectious pathology. The active prevention should be in educating, informing and modifying the behaviors of the users by the sanitary education. Passive prevention should be in increasing the safety of the environment and of the equipment through standardization and the use of risk factors and typology. Opening of a gap in the study of vehicle-infrastructure-driver interactions in collaboration with the Central Laboratory of Bridges and Roads is necessary.

Conflicts of Interest

There is no conflict of interest for this paper.

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