

## Impact of Age and Workload on Road Accidents among Yopougon Drivers In (Cote D'ivoire)

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### ABSTRACT

This study aims at examining the impact of age and workload on road traffic accidents in Abidjan, Côte d'Ivoire. To this end, a questionnaire is administered to a sample of 100 "woroworo" and "gbaka" taxi drivers in the district of Yopougon (Abidjan, Côte d'Ivoire). The subjects were divided into four groups, 2 by 2 according to size, gender, the economic situation of the parents, the number of members in the family of origin, the type of contract and professional seniority. More specifically, in each of the groups, there are 50 subjects, all of them male, from socioeconomically underprivileged parents, from extended families; they are all daily contract workers and each has 5 years of professional seniority. The data obtained are processed using the statistical technique of chi-square. This reveals two results. The first shows that teenage drivers are more likely to be involved in accidents than their adult colleagues. The second indicates that drivers with a high workload cause more road accidents than their peers with a low workload. Both the psychological theory of adolescence and behavioural theory are used to interpret these results.

*Keywords: Age, Workload, Driver, Road Accident*

The postcolonial and colonial era was a period of extreme hardship due to the lack of means of transport in African states. Our ancestors travelled hundreds or even thousands of kilometres on foot to visit a relative or to communicate news to one of their own.

The advent of the automobile was a great relief for all mankind and, in particular, for the African continent. The distances that used to be covered over several days or even months are now covered in just a few hours without the slightest effort. It can therefore be said that technology has made a remarkable advance and that man is the great beneficiary. This undoubtedly contributes to the safety and longevity of humans.

However, this advantage provided by the automobile seems to be neutralised by the numerous road accidents, especially in Africa. The enjoyment that should be derived from the wonders of vehicles sometimes turns into sorrow and sadness.

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Today, automobiles are rather a source of anguish and distress. The paradox is that, despite the misdeeds and damage caused by cars, modern man cannot do without them. This means of transport has become one of the most common means of transport and solutions to this scourge are being proposed by the authorities.

In Côte d'Ivoire, the government has put structures and strategies in place to reduce it to a strict minimum. We can mention, for example, the permanent presence of security guards on the roadsides and the setting-up of the Road Safety Office (OSER), whose role is to raise awareness and train drivers on the insecurity linked to driving: compliance with the radar system, road signs, priority of passage, etc. Despite the existence of these strategies and their deterrent effects, the road death toll is growing over the years. The Ministry of Transport (2020) acknowledges the seriousness of this scourge when it notes that road accidents cause an average of 600 deaths and 13,000 injuries per year in Côte d'Ivoire. Reducing road risks and accidents is therefore becoming an imperative. To achieve this, knowledge of their determinants is essential.

This is the purpose of this study, which attempts to examine some of these factors with a view to contributing to a solution. To this end, the problem addressed, the methodological investment made, the analysis and discussion of the results will be examined in turn.

### **PROBLEMATICS**

Road accidents are a clear reality in Côte d'Ivoire. They are part of the daily life of Ivorians. The Road Safety Office (OSER, 2019) underlines the acuity of the phenomenon by revealing its clear evolution. In 2006 and 2016, 6,084 and 1,8108 cases of accidents were recorded respectively, representing an increase of 301, 80%.

In Abidjan, according to the government (2019) from 1 January to 31 March 2019, the district of Yopougon is ranked first with a total of 673 road accidents, followed by that of Cocody with 441 and then Abobo with 324 accidents, as an illustration.

These accidents, in general, are not without harmful or even dramatic consequences. The OSER (op.cit.) mentions that, from 2006 to 2016, the number of people killed and injured is on the rise. The statistics are worrying: 264.97% dead and 325.4% injured.

As can be seen, this is a real massacre. What can explain this plague? Are the age and workload of the drivers not to blame?

A road accident is an unexpected event that occurs on a road and results in bodily injury and/or material damage. Although it is unpredictable, it is caused by certain situations such as the use of psychoactive substances, fatigue, stress, etc. It is therefore understood as a behaviour.

Two theories help to understand the role of age and workload in the occurrence of accidents. These are Stanley's (1907) psychological theory of adolescence and Skinner's (1953) theory of behaviourism.

Stanley (op.cit.) was one of the first psychologists to propose a psychological theory of adolescence in 1907. This theory, which has certainly evolved to date, states that adolescence is a period of turmoil and stress, characterized by contradictions and disregard

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for norms. It takes place between the ages of 12 and 18. Teenagers see themselves as equals to adults.

Stanley's (op.cit.) psychological theory of adolescence explains the occurrence of road traffic accidents in the adolescent in the sense that the turmoil, that is to say, the disorder, stress and contradictions which constitute the central dimension of his personality make him an unstable individual. This state of unconsciousness and lack of concentration can only predispose the teenager to road traffic accidents.

However, this theory is not sufficient to account for the link between workload and road traffic accidents. It is here that behavioural theory, such as conditioning or operating behaviour, is indispensable. Skinner (op.cit.) develops operative behaviour as an improvement on classical conditioning by adding the principles that the repeated consequences of a series of similar actions taken in the presence of a conditional stimulus will progressively reinforce a more complex association between this conditional stimulus, the series of actions taken by the subject and their consequences. According to this model, the stimulus generates actions or reactions which in turn produce consequences.

Applied to our study, this theory makes it possible to understand that road traffic accidents are attributable, among other things, to overwork. This is presented as a stimulus that can cause fatigue and stress, which can lead the driver to use psychoactive substances that will result in road accidents.

The impact that age and workload could have on the occurrence of road accidents is consistent with some scientific research. Goldberg (1962) shows that crash rates are higher for both young (under 25) and older (60+) drivers compared to the middle age group. The explanation for this behavioural difference is, according to Goldberg, that young people's driving errors are due to excessive dynamism, and older people's driving errors are due to misjudgements and lack of knowledge of the recently introduced traffic rules. Fontaine (2003) focuses mainly on the driving of older people. He reveals that older people are involved in the occurrence of road accidents. The author mentions that senior citizens have detection and assessment problems in their driving task.

Mc Cartt et al. (2000) blame workload by pointing out that having difficulty sleeping on the road, probably because of too much work, is an element that increases the probability of being drowsy during the working day and, therefore, likely to cause road accidents.

The above considerations support our view that age and workload are factors determining road accidents in Abidjan. They lead us to make the following two operational working hypotheses:

- a- Teenage drivers cause more accidents than those who are adults, that is to say, older.
- b- drivers with a high workload are more likely to get involved in accidents than their peers with a low workload.

The verification of these hypotheses requires the development of a methodology for data collection.

## **METHODOLOGY**

The review of the methodological procedures applied covers the research variables, the study sample and the survey materials used.

### ***Description of variables***

With regard to the hypotheses previously formulated, two types of variables emerge from this work. There are two independent variables, age and workload, and one dependent variable, road accidents.

Age is the period of an individual's life since birth. It is a qualitative variable in this study. It has two modalities: the teenager and the adult. Adolescence is the period after childhood and before youth. In this research, a teenage driver is one who is approximately 18 years old. The adult driver is the subject who is at least 35 years old.

Workload is the volume of work performed by the driver per day. It can be observed from the number of hours of work performed each day, that is to say, the amount of time the driver spends in the vehicle. This variable is qualitative in nature and has two modalities: high or low workload. In the first case, the driver spends at least 10 hours on the road without rest. In the second case, he or she spends a maximum of 10 hours with regular 15-minute breaks after 3 hours of work.

The dependent variable is the frequency of accidents by a driver per year. For this study, we consider a period of two years (2018 and 2019). This variable, like the previous ones, is qualitative and dichotomous: high or low accident frequency. Accident frequency is considered high when it is above one (1) accident per year. It is said to be low when the driver has a maximum of one (1) accident per year.

### ***Sample***

The study is carried out in the city of Abidjan, the economic capital. According to the government (2020), the city has 387,799 vehicles in daily traffic or more than 82% of Côte d'Ivoire's fleet estimated at 474,874 vehicles. More specifically, the research is conducted in Yopougon, the largest district of Abidjan. The choice of this district lies in the fact that it has more road accidents than the others (see Problem). With a population estimated at 1,071,543 inhabitants in 2014 over an area of 153.06 km, Yopougon is also the largest district in the country. The traffic of public transport vehicles, particularly those called "taxi woro woro" and "gbaka" is particularly heavy because their fares are generally accessible to a large majority of the population. It is the drivers of these two categories of vehicles that are the focus of this research.

For the selection of the sample, we opted for the technique of on-site sampling. There are two reasons for choosing this method. On the one hand, the lack of a recent and up-to-date sampling frame does not allow us to use the random sampling technique, which is the best sampling technique. On the other hand, the lack of statistical data means that we cannot use the quota procedure, the practical usefulness of which is also known.

On-site sampling, also known as accidental sampling, consists of selecting and interviewing subjects found by chance on the spot and whose characteristics correspond to those of the sample. We therefore went to the "taxi woro woro" and "gbakas" stations and were able to count 300 drivers. We interviewed a total of 100 drivers. They were divided into four groups, two by two, according to the socio-economic situation of the parents, the size of the relatively large family, the type of contract, seniority and gender. More specifically, in each of the groups, there are 50 subjects, all of them coming from socioeconomically disadvantaged parents, from an extended family. They are male, daily contract workers and have a total of 5 years' professional seniority.

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### *Material*

To gather information in the field, we use the questionnaire. It consists of three main parts. The first part relates to the identification of the subjects. It provides information on the respondent's age group, residential neighbourhood, type of dwelling, parents' socio-economic situation and length of time in the car. The second concerns the dependent variable, the frequency of accidents for which the subject is responsible per year. It comprises 3 items specifying the number of accidents that occurred. The third assesses the workload. It does so on the basis of the number of hours worked by the subject per day. It contains 20 items with two types of answers: "yes" and "no".

## **RESULTS**

The information collected from drivers gives rise to two levels of results. One indicates that teenage drivers cause more accidents than their adult peers. The other reveals that drivers with high workloads are more likely to be involved in road accidents than their counterparts with low workloads.

### *Road accidents according to drivers' age*

The chi-square test is used to assess the impact of age on the number of accidents. It is applied to the data in the table below:

*Table 1: Distribution of accident frequencies based on the age of drivers.*

Age \ accident frequency	Low frequency	High frequency	Total
Teenage drivers	18 28,50	32 21,50	50
Adult drivers	39 28,50	11 21,50	50
Total	57	43	100

Applying chi-square results in a significant value of 34.37 at the .01 probability threshold. It therefore reveals the existence of a significant difference between the frequencies of the two groups of drivers compared.

Careful analysis of the data in the table indicates that, among teenagers, most of them (32 subjects out of a total of 50, or 64%) cause a high frequency of accidents, while a minority of them (18 subjects out of a total of 50, or 36%) have a low frequency of accidents.

The result is the opposite for adult drivers. Here, the majority (39 subjects out of a total of 50, that is 78%) report a relatively low frequency of accidents against a tiny proportion (11 subjects out of a total of 50, that is 22%) with a high frequency of accidents.

Therefore, we can state that our first hypothesis has been verified. This means that teenagers are more likely to be involved in road accidents than adult subjects who are more self-confident when driving.

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Stanley's psychological theory of adolescence (Cf. Problématique) sheds light on such a conclusion. The teenager, compared to the adult, is an immature individual who lacks experience. This is a major weakness in the way he makes decisions and acts. Inexperience can often lead the teenager to act without paying much attention. They often proceed by trial and error, often resulting in failures or mistakes. It is obvious that such a person cannot succeed in an activity such as driving, which requires more attention, especially in a megalopolis like Abidjan.

The overflowing energy of teenagers exposes them, unlike adults, to frequent acts of recklessness, and therefore to high risk taking linked to frequent unsafe driving behaviour. Teenagers do not often hesitate to make very complex, dangerous, even deadly demonstrations to show everyone who wants to admire their bravery. So, they compete with each other for speeding, pay little attention to vertical signs (road traffic regulation signs) and horizontal signs, and do not hesitate to walk on sharp lines and pavements. They are even capable of dangerous overtaking (on shores, at the top of hills...) not to mention that they do not "calculate" unwary pedestrians and groups of children. In this way, they multiply the risks of unsafe driving and, therefore, of road accidents. A WHO study (2013) corroborates the above when it reports that, globally, teenager deaths are mainly due to preventable accidents. It also notes that the leading cause of death among teenagers is road traffic crashes. Martel (2013), through a statistical study conducted between 2009 and 2013 in Canada, shows that suicide is the second leading cause of death among teenagers, especially among boys.

Teenagers' lack of social maturity leads them to have illusions, superstitions and misjudgements that encourage unsafe driving behaviour and, as a result, high risks of traffic accidents. Unlike adults, teenagers are quick to take risks without any worries. When driving, teenagers tend to minimise dangers and threats, and therefore underestimate road safety.

The readiness of teenagers to naturally indulge in the alcohol and drugs they experience also contributes to their high accident risk. The consequent impairment of their psychobiological faculties makes them responsible for reckless driving. The adoption of addictive behaviour further reduces their lucidity and alertness when driving. It sets them up in an aggressiveness that is incompatible with road safety behaviour. It increases their appetite for risk, and therefore their taste for adventure when driving.

With regard to the personal characteristics of the teenager we have just described, we can say that the high frequency of accidents among teenage drivers is due to their inexperience, overflowing energy, social immaturity and their readiness to use psychotropic drugs. Conversely, adults are experienced and socially mature. They are therefore no longer involved in emotional behaviour as teenagers are. They take a step back and take into account their socio-familial responsibilities because they have a spouse, children and other relatives in charge. All of this moderates their risk-taking when driving, makes them attentive to the traffic rules, and keeps them alert or lucid, which limits the number of accidents they are likely to be involved in. Unlike teenagers, their distinct way of viewing the world and experiencing reality keeps them away from the search for intense pleasure or thrills at the wheel, in other words, makes them less anxious about driving. As a result, they only take calculated risks, aspiring not to make widows and orphans in their families. For those of them who are not candidates for drug addiction, acts of recklessness when driving tend to be rare rather than exceptional. Knowing that they are under great social pressure

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exempts them from reckless or unsafe road behaviour such as dangerous or prohibited overtaking, excessive speeding, failure to observe the rules of priority, inattention to pedestrians, and so on.

### *Workload and road accident*

To test the influence of workload on the frequency of accidents among "woro woro" and "gbaka" drivers, the chi-square significance criterion is used on the data in this table :

**Tableau II:** distribution of driver frequencies according to workload and accident frequency.

workload \ accident frequency	accident frequency		Total
	Low	High	
Low workload	38 27	12 23	50
High workload	16 27	34 23	50
Total	54	46	100

The calculated chi-square indicates a value of 19.48. This is significant at the .01 probability threshold. This means that the two groups differ significantly in terms of the frequencies compared.

A review of the frequencies in the table shows that among drivers with a low workload, the majority (38 subjects out of a total of 50, or 76%) are responsible for a low rate of road accidents, while a minority (12 subjects out of a total of 50, or 24%) have a high frequency of accidents.

On the other hand, among drivers with a high workload, a high proportion (34 out of 50, or 68%) are more likely to be involved in road accidents, compared to a minority (16 out of 50, or 32%) with a low accident frequency.

Our second working hypothesis is, therefore, verified. We can argue that drivers who languish under the weight of high workloads are more likely to be involved in road traffic accidents than their peers with low workloads.

Skinner's behaviourist theory (operant conditioning) (see Problem) makes this result easy to understand. Work overload is not without bodily fatigue. An individual who works non-stop for hours finds himself with tired or even tetanised muscles and is therefore weakened by lack of sleep. This is the case for drivers who start their activity at 4.30 or 5 in the morning and only start to get off at 10 or 11 in the evening. They are obliged to spend this time driving in order to comply with one of the clauses of the employment contract, which consists of paying the amount of 20,000 francs a day to the owner of the vehicle and to provide for the daily food and other expenses for their family. In reality, it is a struggle for economic survival. Under these conditions, the occurrence of accidents can only be an evidence.

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Very often, in order to combat fatigue and exhaustion (burn-out) due to overwork, some drivers do not hesitate to take drugs or narcotics. By consuming these toxic substances, they defer the effect of fatigue. For them, these products have the effect of considerably reducing the fatigue they feel, increasing their resistance to difficulties, and restricting their rest time which could restore them. However, taking psychotropic drugs inhibits their driving reflexes, significantly reduces their vigilance and even their professional consciousness. By doing so, they are predestined for road accidents, even if they can be avoided.

It should be noted that the driver, under the weight of the workload, may be under stress. Stress is often synonymous with poor performance. The subject is inhibited and makes mistakes that are normally avoidable. Thus, pathological stress creates anxiety, anguish and fear in the subject. It leads to behaviours such as lack of vigilance, disintegration of action patterns, trembling, nervousness, aggressiveness, etc. All these reactions can only predispose the driver to road accidents.

Conversely, drivers with a lighter workload experience little fatigue and little stress. They are relaxed in the performance of their task. They do not risk their lives to survive. Few of them submit to fatigue, alcohol, let alone drugs, in the hope of having supernatural strength. The serenity that moves them explains the low frequency of accidents among them. For them, the occurrence of an accident is purely by chance.

### **DISCUSSION**

This study found that teenage drivers are more likely to be involved in road crashes than their older counterparts.

This conclusion is supported by some scientific research. For example, Ulleberg and Rundmo (2002) show that teenagers are more frequently involved in road traffic crashes than other age groups. This fact, according to them, can be explained by the antisocial personality features such as social deviance, impulsivity, emotionality and aggressiveness that characterize teenagers.

Rallu (1990) conducted a study on the serious accident rate of passenger car drivers in 1982 per 100 million kilometres travelled. He notes that the rates are higher between 18 and 29 years of age than between 30 and 64 years of age. This, according to the author, is due to a taste for risk among the youngest.

Assailly (2007) shows that there is an over-risk of serious accidents among young drivers aged 15-25. He points out that people aged 18 to 19 are three times more likely to be involved in accidents than drivers aged 30 to 69, while those aged 20 to 24 are twice as likely.

However, the opposite point of view is sometimes reported regarding the impact of driver age on accident frequency. For example, McPhee et al (2004) conducted a study to show the impact of age on driving. The experiment involves searching for traffic signs in digitised images of traffic scenes. They compare young adults aged 23 and older adults aged 64. They note that older adults are less accurate than younger adults, especially on heavily congested circuits, are slower to decide that a target sign is not present, and have a slightly greater attention effect on reaction times. These observations lead them to the conclusion that older adults are more likely to be involved in road accidents than younger ones.

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The second result of this study indicates that drivers with a high workload are more likely to be involved in road accidents than their peers with a low workload. This is in line with the findings of other researches.

Williamson and Boufous (2007), reviewing the factors associated with road crashes, find that the majority of road crashes are related to fatigue, which in turn is related to high workload.

Mc Cartt et al (2000) conducted a study which aimed to identify factors related to driver drowsiness or sleepiness when driving which undoubtedly leads to traffic accidents. They indicate that this damaging behaviour is due to fatigue caused by high workload. They therefore suggest that measures should be taken to limit drivers' working hours so that they can get enough rest to reduce drowsiness, which in turn reduces traffic accidents.

### CONCLUSION

In Côte d'Ivoire, despite the efforts of the government to combat road accidents, this phenomenon is still evident. Consequently, there is a need for an explanatory study of road accidents. To this end, we have just established that the fact of being less old or a teenager and the high workload are sources of frequent road traffic accidents. These conclusions suggest some proposals for action.

With regard to the influence of age, it is important to note that the driving profession is clearly reserved for adults, who are wise and who demonstrate a certain social and family responsibility. On the other hand, teenagers should not be allowed to apply to drive, whether professionally or not.

As far as workload is concerned, a somewhat relaxed schedule for the driver appears to be a definite route to road safety. The high workload for the driver is rather destructive for the driver and for society. It would therefore make sense to engage the road traffic partners in negotiations to agree on the optimum workload that would reduce the frequency of road accidents. Drivers would benefit, as would the owners of vehicles whose assets would have a longer lifespan. Accident services would benefit with a simple reduction in the financial costs associated with passenger deaths and injuries. Even the State has an interest in this by obtaining a reduction in intervention costs (reorganisation of road circuits, mobility of civil protection services, movement of security forces).

On another level, a driver's workload can be reduced by employing a substitute driver.

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### **Conflict of Interest**

The author(s) declared no conflict of interest.

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