

Traffic accidents in Algeria (1970-2022):**A descriptive statistical study****حوادث المرور في الجزائر (1970-2022): دراسة إحصائية وصفية**

* BAKI Boubakeur bakiboubakeur@gmail.com	Demography	University of Oran. 2. Mohamed Ben Ahmed . algeria
RACHEDI Khadra Rachedi.khadra@univ-oran2.dz	Demography	University of Oran. 2. Mohamed Ben Ahmed . algeria.

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Abstract:

Algeria has witnessed a significant increase in the phenomenon of traffic accidents in recent years, which causes the most deaths among young people and those aged 50 and over, mostly males, which increases the demographic waste of our country. The phenomenon also results in injuries, disabilities, and physical and psychological illness, which negatively affects the population, society, and development. We will highlight the phenomenon that has swept our society in a large and terrible way, recording nearly 3,000 deaths and 30,000 injuries annually. Our study provides a description of the development of deaths and injuries resulting from traffic accidents in Algeria since 1970, as well as presenting the causes that are primarily due to the driver at a rate of 90 percent, then the vehicle, then the environment, and its most important indicators indicating its weight from measuring the severity of its danger, as well as its contribution to general deaths. We present a comparison with advanced countries in achieving quality levels in traffic safety, and we contribute through our article to proposing strategies for effective and efficient solutions, the first of which is for the human element, then those related to vehicles, and then the environment.

* Corresponding author: bakiboubakeur@gmail.com

Keywords: population; traffic accidents; deaths; injuries; indicators; strategies

ملخص:

شهدت الجزائر في السنوات الأخيرة ارتفاعاً ملحوظاً في ظاهرة حوادث المرور، والتي تُعدّ من أهم أسباب الوفاة بين الشباب والفئة العمرية فوق الخمسين، وغالبية من الذكور، مما يؤدي إلى زيادة الهدر الديموغرافي في بلادنا. كما ينجم عن هذه الظاهرة إصابات وإعاقات وأمراض جسدية ونفسية، مما يؤثر سلباً على السكان والمجتمع والتنمية. سنسلط الضوء في هذا البحث على هذه الظاهرة التي اجتاحت مجتمعنا على نطاق واسع وبطريقة مروعة، مسجلة ما يقارب 3000 حالة وفاة و30000 إصابة سنوياً. وتقدم دراستنا وصفاً لتطور حالات الوفاة والإصابات الناتجة عن حوادث المرور في الجزائر منذ عام 1970، بالإضافة إلى عرض الأسباب التي يعود معظمها إلى السائق بنسبة 90٪، ثم المركبة، ثم البيئة، وأهم مؤشرات التي تدل على خطورتها، وكذلك مساهمتها في الوفيات العامة. كما نقوم بمقارنة مع الدول المتقدمة في تحقيق مستويات الجودة في السلامة المرورية، ونساهم من خلال مقالنا في اقتراح استراتيجيات للحلول الفعالة والناجعة، أولها العنصر البشري، ثم ما يتعلق بالمركبات، ثم البيئة. الكلمات المفتاحية: السكان؛ حوادث المرور؛ الوفيات؛ الإصابات؛ المؤشرات؛ الاستراتيجيات.

Introduction :

The latest World Health Organization (WHO) report (2023) on traffic accidents and deaths in the world indicated that the world records about 1. 19 million deaths due to these accidents, i.e. 15 deaths per 100,000 inhabitants, as it is the main cause of death for children and young people between the ages of 5 and 29 years, where two thirds of fatal accidents occur in the working age population 18 - 58 years. 58 years old and ranks twelfth of the total deaths in the world for 2019, where 9 out of 10 deaths occur in low- and middle-income countries despite the fact that they own 60% of all vehicles in the world, half of these deaths occur on dangerous roads and target pedestrians and cyclists, where the highest death rates are recorded in the African Organization region and the lowest in the European Organization region, and these accidents also exacerbate the economic cost, which amounts to 3% of its GDP that could be preserved and used for development.

Algeria is among the Arab countries that are witnessing a serious rise in traffic fatalities, in addition to the accumulation of a large number of disabled people as well as material losses in private and public property. Between 2000 and 2022, according to statistics from the National Delegation for Road Safety, the severity of accidents, which represents the number of fatalities to the number of injured, increased from 0.092 to 0.110, and the ratio of fatalities per 100 accidents increased from about 11 to about 15. This means that despite the efforts made by national and international bodies, especially at the level of legislation to reduce

them and raise awareness of their seriousness, they are still an important cause of deaths, especially with the urban growth witnessed by the country and the increasing demand for transportation.

This phenomenon has a negative impact on population movements, which reflects an important aspect of “demographic waste”, especially in the category of children, youth and males in particular. It also accounts for the loss of competencies, expertise, human and material capital and the resulting social and psychological effects, in addition to the economic impact on the state from the costs of compensating the human capital. In addition to the economic impact on the state from the costs of compensating the human capital and exorbitant expenses from various directions, such as health coverage from hospital funding and compensation expenses, as well as insurance for human and material losses and the budget for various follow-ups from basic facilities such as infrastructure, roads, lighting, painting, and signage.

In this study, we will take a descriptive statistical approach to traffic accidents and the resulting mortality, while trying to model them to know their relationship with some variables in order to be able to predict their size in the future.

Therefore, this study aims to track the evolution of the number of traffic accidents in Algeria, the number of deaths and injuries resulting from them, the main causes and the most important efforts made to reduce them, based on the statistics provided by the National Delegation for Road Safety until 2022.

1- Traffic accidents in Algeria

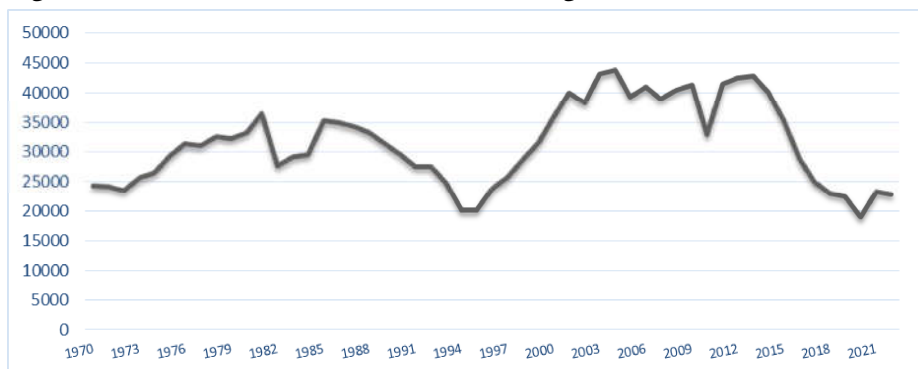
1-1- Evolution of traffic accidents in Algeria:

Algeria has recorded a large number of traffic accidents since 1970, estimated at 24,473 accidents in that year, which is a very large number compared to the total population, which was around 13 million people, which provides quantitative statistics that remain silent about the reality of deaths and serious injuries that require a deeper study and follow-up (Dr. Benabdallah 1986). Fifty years later, in 2022, the number of accidents reached 22,908, while the population more than tripled to 44.3 million. This shows a clear decrease during this period, noting that there are oscillations between highs and lows, which calls for distinguishing between two distinct phases, as shown in Figure 1.

The first phase relates to the period between 1970 and 1995, a period that witnessed very important events that had an impact on the frequency and volume of accidents. After a decline until 1972, the number of accidents increased rapidly until 1981, and this can be attributed to the demographic growth that witnessed a huge explosion in addition to the dynamism of the national economy and its development. During this period, and within the framework of Algerian TV's awareness programs, the Hidden Policeman, which began in 1974, attracted a large number of viewers in the presence of a single channel, which may have contributed to the decrease in traffic accidents, especially in 1982. Traffic accidents rose again until 1985 and then began to decline, especially with the issuance of the new traffic law 87/09, and the worsening of the security crisis in the 1990s, which encouraged a clear decline in traffic, especially with the imposition of the curfew, to continue to decline until the end of this period.

In the second phase, between 1996 and 2022, traffic accidents increased significantly and continuously until 2004, then fluctuated between 39,000 and 41,000 accidents, with the highest value recorded in 2013 (42,846 accidents). Algeria ranked fourth in the world that year after Italy, Germany and France (Dredsch, 2013), which can be explained by the increase in the number of vehicles and the continued deterioration of the existing road network, which did not witness appropriate expansion, although this period witnessed the promulgation of Traffic Law 16/04, which emphasized fines and penalties to enhance traffic safety (Saidani and Boualoul, 2022). Then it almost halved in 2022, during which time the road network improved and the start of the highway, in addition to the rationalization of the vehicle fleet (Saidani and Boualfull, 2022). In 2020, the year of the COVID-19 pandemic, quarantine contributed to the decline in traffic accidents in general.

Figure 1: Evolution of traffic accidents in Algeria between 1970 and 2022.



Source: National Delegation for Road Safety 2022.

1.2 - Evolution of the volume of injuries resulting from traffic accidents in Algeria

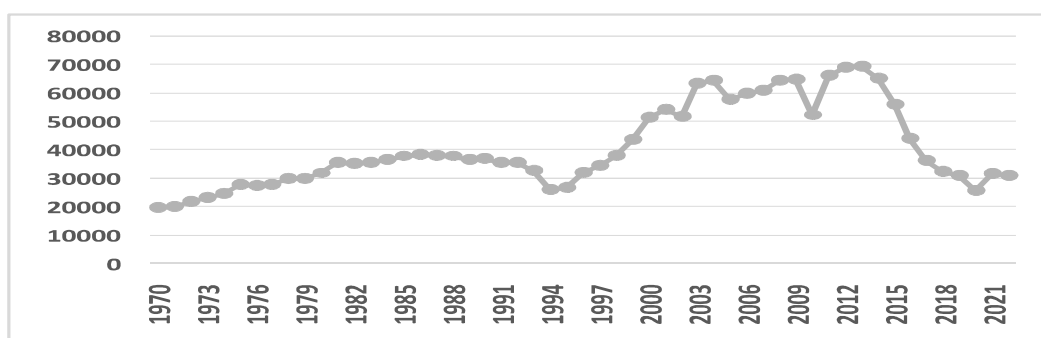
Injuries have undergone three important phases in their development since 1970:

The first stage (1970-1994): Injuries have been high since 1970 its 19730 accidents and continued to rise to reach 38548 injuries in 1986 and then decreased slightly in 1994, when Algeria experienced a phenomenon known as the Black Decade, characterized by an emergency security situation where transportation decreased at the national level.

The second phase (1995-2013) This period witnesses a qualitative leap from security and safety, prosperity, social and economic recovery and the import of cars with greater thanks in exchange for the road networks remaining less expanded, which rose year after year to reach an unprecedented limit, and Algeria did not record nearly or more than 69,500 injuries during the year 2013, where the state took many measures to remedy the situation and enact new laws and work on sensitization, awareness and study.

The third phase (2014-2022) In this phase, the number of injuries decreased significantly and positively after the intensive efforts of several active bodies from the police, national gendarmerie, civil protection, civil society, and coordination with the National Delegation for Road Safety through information, field work, follow-up, accompaniment, sensitization and awareness And with the intensification of efforts and the importation of high-quality vehicles in recent times and the correction of stumbling blocks from previous periods, it decreased until it reached low numbers, but more work must be done while it also remains alarming within the limits of 30,977 injuries recorded for the year 2022, which is observed as shown in the graph:

Figure 2: Evolution of the number of injuries resulting from traffic accidents in Algeria between 1970 and 2022.

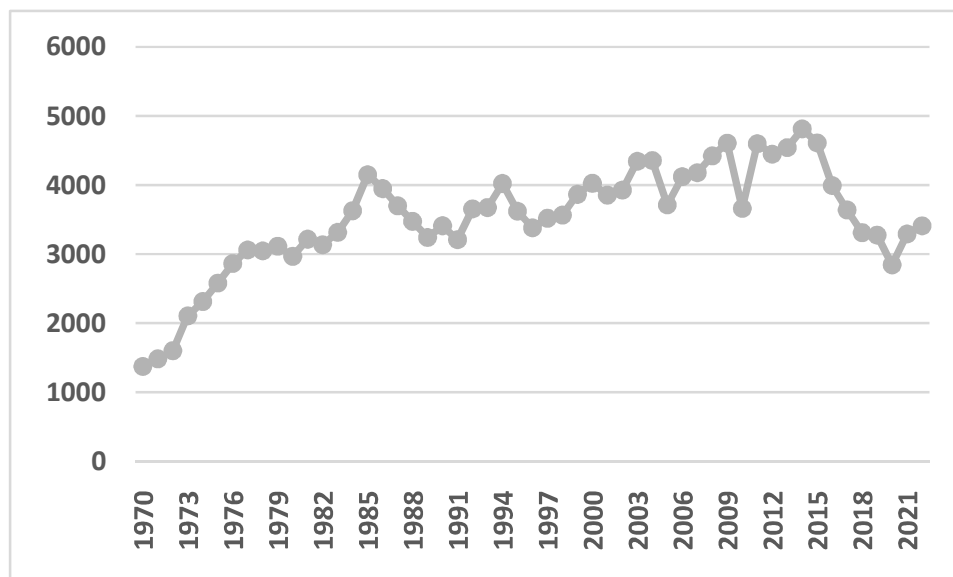


Source: National Delegation for Road Safety 2022.

1.3 - Evolution of the number of deaths resulting from traffic accidents in Algeria

In contrast to the number of traffic accidents and the number of injuries, which witnessed a significant decrease, the number of deaths resulting from these accidents has been continuously increasing, but at an almost stable pace, as it can be seen that the pace has been rapid since the beginning of the 1980s, and despite the decrease recorded in some years, it always tends to increase, and starting from 2014, it begins to gradually decrease, only to increase again starting from 2021. This picture of the evolution of fatalities is based on the same conditions as the evolution of the number of traffic accidents and the number of injuries resulting from them.

Figure 3: Evolution of the number of traffic fatalities in Algeria, 1970 and 2022.



Source: National Delegation for Road Safety 2022.

1.4 - Indicators of traffic fatalities in Algeria

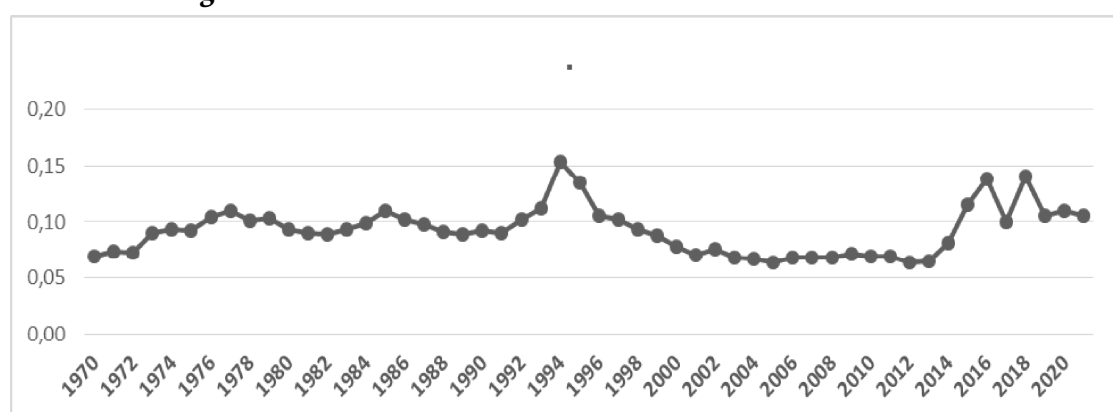
In order to know the importance of the volume of fatalities and its relation to some variables, a set of indicators were calculated that can closely describe this importance:

- Indicator of the number of fatalities to the number of injuries from traffic accidents

The graph of the index of the number of fatalities to the number of injuries in the sense of the severity of the accident recorded during the past 50 years, starting in 1970 with the lowest value of 0.07 to rise in 1980 to 0.10 to remain within that range until 1994 to reach its peak at the maximum height of 0.15 to then decrease at a faster pace to recognize this difficult stage of social issues that Algeria went through, which led to a decrease in road traffic, to

record the lowest value in 2006 with 0.06 to remain at that pace until it rose again to higher levels in 2016 to reach 0.14 and then remained high in 2020 by 0.11, and in general they are high values compared to, for example, the country of Belgium from 2022 recorded an accident severity value of 0.014 (International Transport Forum 2023), which is far from 0.1, which calls for a reconsideration of raising the level of traffic safety in all its aspects.

Figure 4: Indicator of the number of fatalities to the number of injuries for traffic accidents in Algeria.



Source: National Delegation for Road Safety 2022.

Considering the relationship between the number of fatalities and the number of injuries, whose model was estimated by simple regression:

$$\text{Number of fatalities} = 0.44 * \text{Number of injuries}$$

This means that each one-unit increase in the number of injuries is associated with an average increase of 0.44 points in the number of deaths.

- Indicator Number of deaths per 100,000 inhabitants (1970-2022).

The second indicator of the number of deaths per 100,000 inhabitants for Algeria over the past 50 years shows a kind of improvement, as it decreased from a severity of 10.32 in 1970 to a severity of 18.98 in 1985 to a severity of 6.85 in 2021, a qualitative leap from good traffic safety. Compared to

many countries that still suffer from a severity value of more than 8 in 2021, we note that Algeria, after 1985, experienced a small and steady decline until 2010 to record the best value in the range of 8.21, then rose slightly in 2015 in the range of 11.54, after which it experienced a successive decline to reach the best value in the severity of 6.85. This decrease came as a result of work and concerted efforts, and the traffic safety process remains the duty

of everyone to participate in, support, support and evaluate it, because it is a loop that benefits all residents, without exception. However, despite this decrease, this indicator remains rather high compared to many countries in the world, but also better compared to others. According to the World Health Organization statistics until February 2024, the value of this indicator per 100,000 inhabitants ranges from 34 deaths in Libya to only 1.5 in Norway, while Algeria recorded 18.3 deaths.

Table 1: Indicator Number of deaths per 100,000 inhabitants in selected countries.

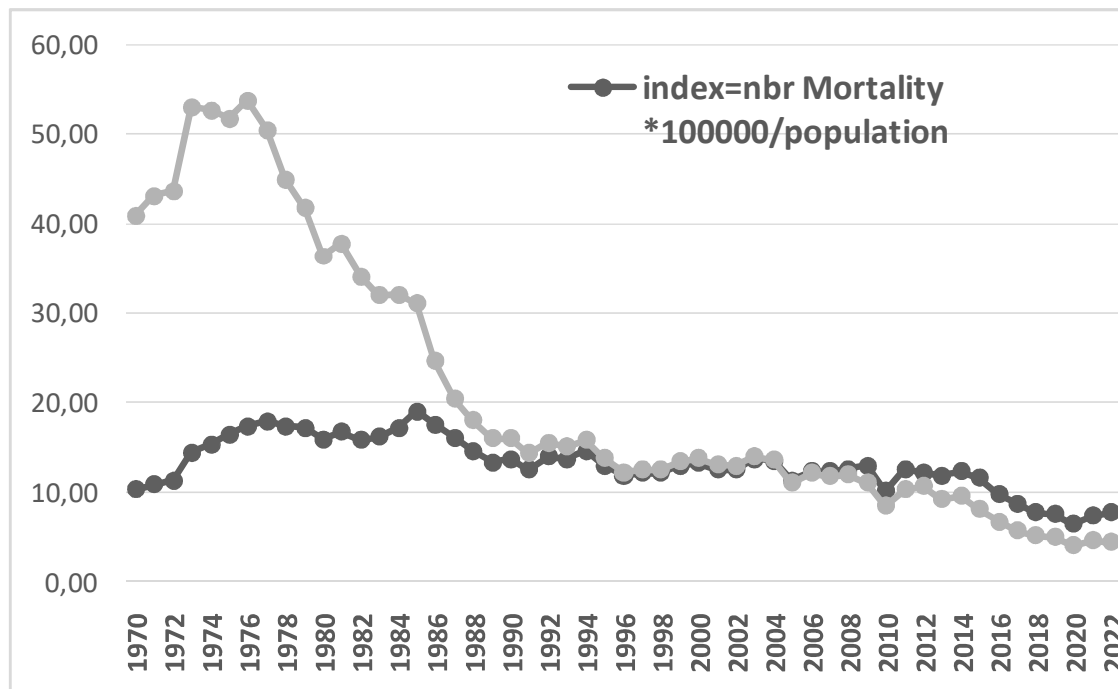
Country	Algeria	Tunisia	Libya	Arab emirates	Qatar	States United	Norway	Sweden
Indicator	18.3	16.3	34	5.9	7.3	14.2	1.5	2.1

Source: World Health Organization (2024).

- Indicator Number of deaths per 10,000 vehicles (1970-2022):

Jacobs (1986) categorizes this indicator as one of the best indicators to measure the level of traffic safety (Al-Zahrani, 1998) and is often used to study the evolution of the number of vehicles and its impact on the number of fatalities. This index represents the number of fatalities per 10,000 vehicles, which experienced a quantum leap from 1970, when it recorded a severity of 40.94 and peaked in 1976 with a severity of 53.76, meaning that the number of vehicles was small compared to the number of fatalities. The best value was a low intensity and good for traffic safety despite the increase in the number of vehicles to reduce the intensity to about a quarter, which is an important result for several reasons, the most important of which are the rapid development in the safety of cars on drivers and passengers, the improvement of many roads, and the high level of awareness and awareness.

Figure 5: Indicator Number of fatalities to population and number of vehicles.



Source: National Delegation for Road Safety.

2- Traffic accidents during the year 2022:

2.1- The number of accidents, deaths and injuries:

In 2022, the number of traffic accidents amounted to 22,908 accidents, resulting in 30,977 injuries and 3,409 deaths for various reasons, and 75% of them occurred in urban areas. Unfortunately, these figures call for a comprehensive review of traffic safety in all its aspects, from the human element, vehicles, and the surroundings more effectively with emergency and rapid intervention for all.

2-2 - Deaths and injuries for the year 2022 by age and gender: The variable of age and distributed by the number of deaths provides us with a clear picture that the most common age of death is from the category of 50 years and above with a number of 785 deaths to be considered the fragile category of the elderly, followed directly by the category of 25-30 by recording 430 deaths, where the majority of them are drivers, and it is noticeable that no category was spared from death, as the number of deceased children was estimated at 457 child deaths during the year. The same applies to the volume of injuries, where the most affected age groups are distributed with the same importance as the deaths. This means that, despite these disparities, all ages are vulnerable to injuries and fatalities, resulting in a significant waste of human capital, which means the need for urgent and rapid intervention

to preserve the population and exploit all traffic safety improvements.

Table 2: Distribution of the number of traffic injuries and deaths .

Variables		mortality	Injury
Age groups	-5	199	1380
	5-10	158	2615
	10-15	100	1903
	15-20	230	3135
	20-25	355	4365
	25-30	430	4040
	30-35	366	3075
	35-40	333	2444
	40-45	221	1904
	45-50	189	1525
	50+	785	4571
	Unspecified	43	20
Gender	Male	2873	24572
	Female	536	6405
Total		3409	30977

Source: National Delegation for Road Safety 2022 .

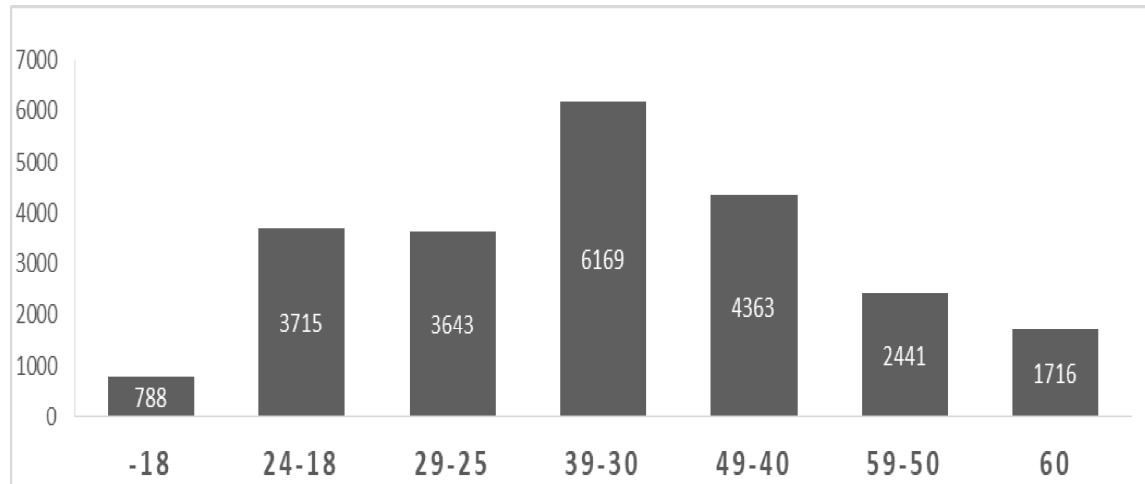
By gender, the injured and deceased males constitute the highest percentage, amounting to 84.3% of the total deceased and 79.3% of the total injured, and this is due to the fact that males are more present at the scene of accidents as drivers causing accidents or victims.

2.3 - Traffic accidents in 2022 according to the age of the driver:

The age of the driver is an important variable in the issue of traffic accidents, as statistics indicate that the most frequent causes of traffic accidents are 30-39 years old (6169 traffic accidents), followed by 40-49 years old (4363), and then the younger groups between 18 and 29 years old, but it is still very important. However, what is alarming is the presence of groups under 18 years old, i.e. below the legal age at which driving is allowed, caused a significant number of accidents (788 accidents). This may be due to the fact that this group is more likely to drive motorcycles, whose owners often do not have a license or qualifications to drive, and are more reckless and maneuverable on the roads, which is confirmed by data

from the National Delegation for Road Security, which indicated that more than 20% of accidents are caused by motorcycles.

Figure 6: Distribution of the number of traffic accidents according to the age of the driver in 2022.



Source: National Delegation for Road Safety 2022.

2-4- Geographical and temporal distribution of traffics accidents in 2022.

The data clearly shows that traffic accidents occurred mostly in urban areas with 17,186 accidents (5722 accidents). Algiers ranks first with 944 accidents, followed by Chlef with 872 accidents, Messila with 841 accidents, Batna with 823 accidents, and Setif with 788 accidents. These are the most populated areas with major axes of roads and municipal and national branches, which makes them an important theater for these accidents. The number of traffic accidents on weekdays is almost constant, with approximately 3,200 to 3,500 accidents per day throughout the year, unlike the hours of the day, which have a clear dispersion. Accidents peak between 18:00 and 11:00 a.m., where 30 percent of accidents were recorded this year, amounting to 22,809 accidents. As for fatalities, the regions with the highest number of accidents record the highest number of fatalities, led by Messila with 154 deaths, followed by Setif with 137 and Algiers with 129. Most of these deaths were recorded in the months of July and August, with an average of 400 deaths per month, which are the two months of annual vacations when vehicles move the most.

While injuries also recorded an increase in the state of Messila with 1302 injuries, followed by Batna with 1207 and Algiers with 1102 injuries, most of which were in the four months

from May to August with an average of 3,000 injuries. This is the summer period that includes annual vacations and domestic tourism, which has flourished in recent years.

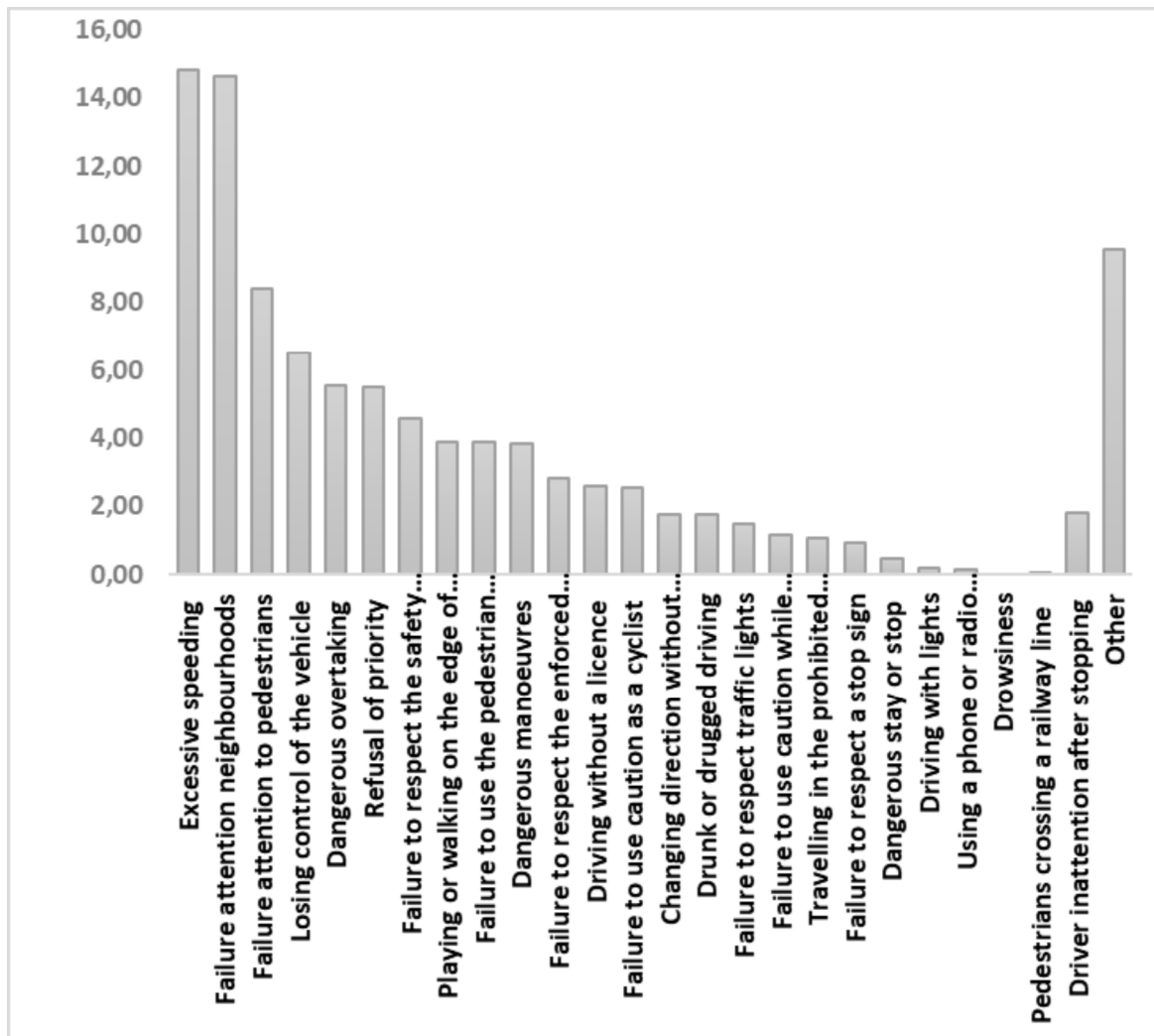
3- Causes of traffic accidents in Algeria

The majority of researchers and specialists in the field of traffic safety agree that the main factors in the phenomenon of traffic accidents are the human element, the vehicle and the environment. The national data for the year 2022 shows that the first and most common cause is the human factor with 97%, then the vehicle with 2%, and finally the environment with 1%.

3.1 - Causes related to the human factor:

The graph gives us a clear picture that the two most recorded causes of accidents are excessive speed (14.81%) and inattention within neighborhoods (14.63%), while in third place comes the failure to take care of pedestrians, followed by driving issues (6.53%), represented by loss of control of the vehicle or lack of experience. Other causes include dangerous overtaking, refusal to yield, failure to respect the safety distance, as well as vehicle collisions, in which drivers and other road users may contribute to the collision. Driver behavior, visual acuity, hearing, decision-making ability, reaction time, and distraction from mobile devices play a significant role in putting them at four times more risk of crashing their cars than those who don't use phones. Research conducted by the Virginia Institute of Transportation Technology found that drivers who text while driving are 23 times more likely to be involved in a crash than drivers who don't text. Phoning is the most dangerous distraction, increasing the likelihood of a crash by 12 times, followed by reading or writing, which increases the risk by ten times (St.fleur.nicholas2016).

Figure 7: Causes of traffic accidents related to human factors in 2022 .

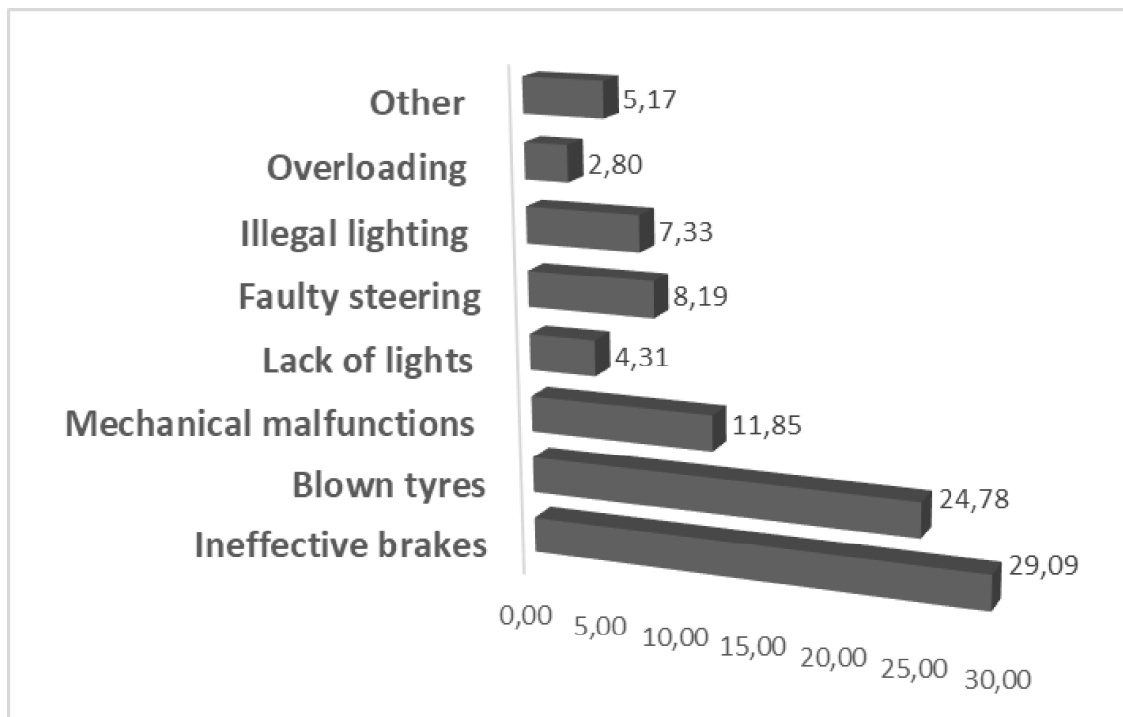


Source: National Delegation for Road Safety 2022.

3-2- Causes of traffic accidents related to the vehicle

It is clear from the data that the vehicle has an important role in traffic safety, where the first apparent cause is ineffective brakes, which is approximately 30 percent, followed by the failure to monitor tires and their explosion by 24.78 percent, then mechanical defects, which recorded 11.85 percent, and this can be linked to the argument that maintenance and follow-up of the vehicle is expensive, especially for middle and low-income people.

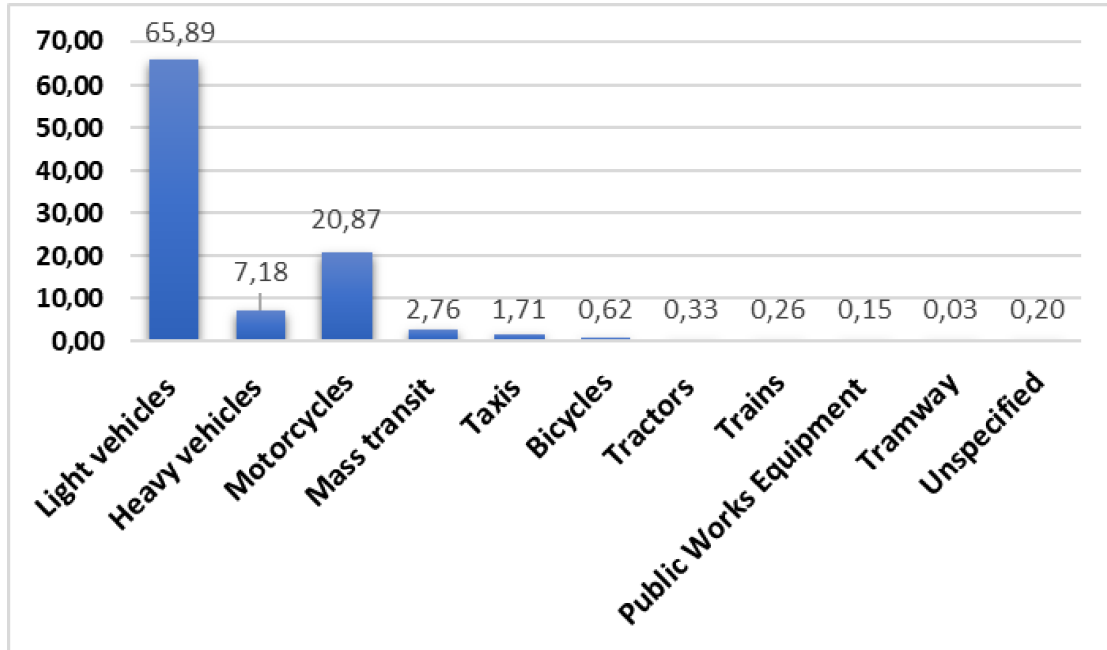
Figure 8: Causes of traffic accidents related to the vehicle in 2022 .



Source: National Delegation for Road Safety 2022.

A clear description of the issues of light vehicles causing traffic accidents from the total with 65.89%, followed by motorcycles with 20.87%, whose context is recognized by the overwhelming majority of reckless youth from teenage ages and young people under the age of 25, knowing that globally, motorcycle riders account for 30% of deaths(WHO.2023). This is followed by heavy vehicles at 7.18 percent, followed by mass transit and taxis at 2.76 and 1.71 percent, respectively.

Figure 9: Types of vehicles causing traffic accidents in 2022.

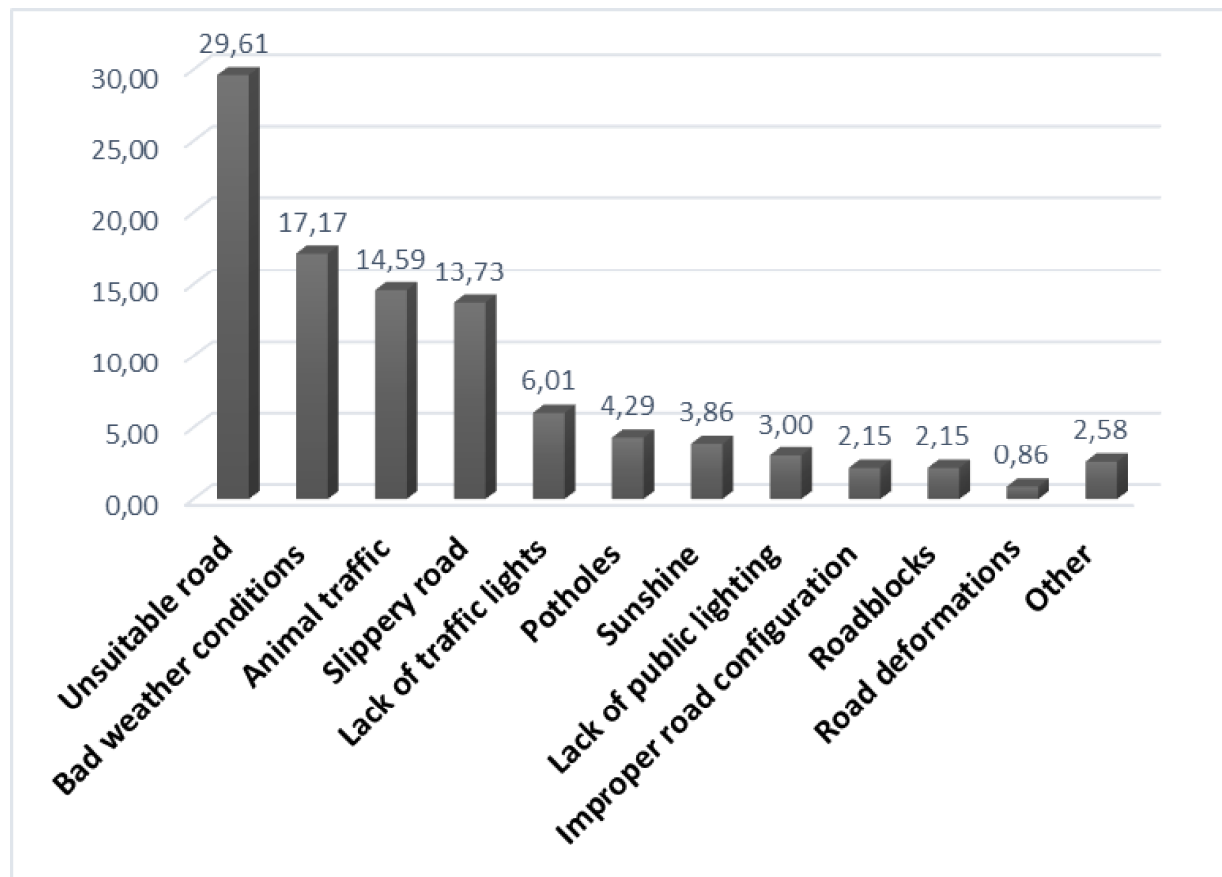


Source: National Delegation for Road Safety 2022.

3.3 - Causes related to the surroundings

We notice from the graphical representation of the causes related to the environment that there is a major defect in the quality of roads and their poor levels of traffic safety, as it records 29.61% of the causes of accidents, followed by bad weather conditions with 17.17%, then in third place what can be suspended by the passage of animals with 14.59%. 59% and then the reason that the researcher considers, which is the observation through driving for 10 years, that there is a significant lack of lack of traffic lights, which recorded 6.01%, then there are other factors such as potholes, sunshine, lack of public lighting, inappropriate road configuration, barriers and deformities, which are in varying percentages that are few and remain significant in total.

Figure 10: Causes of traffic accidents related to the environment in 2022.



Source: National Delegation for Road Safety 2022.

To reduce the causes that exacerbate traffic accidents and thus injuries and deaths, Algeria seeks to do so within the framework of laws and conventions, as it is classified among the countries that have legislation on basic vehicle safety standards (two pieces of legislation) and laws on speeding, drunk driving, motorcycle helmets and seat belts, the latter three of which are among the five laws recommended by the World Health Organization to ensure road safety. It is also one of the countries that adheres to the main UN conventions related to road safety, but only one out of seven, unlike neighboring countries such as Tunisia, which adheres to all conventions, and Morocco with four conventions.

4- Modeling traffic accidents

Several studies dealt with the modeling of traffic accidents with different statistical methods that took a different set of independent variables, including the studies of Saidani and Benhabib. 2014, and Saidani and Bouleval, 2022. The latter found that there is a direct relationship between traffic accidents and, in order of importance, the distance traveled, then the number of buses and finally the length of the total network, and also a direct relationship

between the number of fatalities, the number of accidents and the length of the road network. In this study, we used standardized multiple linear regression to find out each indicator and its relationship with other variables that could affect its value.

In the case of traffic accidents, in order to know which variables are the most influential in the volume of traffic accidents, with the number of accidents as the dependent variable, and the number of population and the number of vehicles as independent variables, their selection was theoretically due to the possibility of a relationship between them and the dependent variable and to keep the modeling within the limits of the data used in it. However, it turns out that these two variables explain about 48% of the variation in the number of accidents, which means that there are other variables that are no less important than them, and looking at the causes of accidents as we saw earlier, which we found that 97% of them are due to the human factor, where both excessive speed and inattention lead, which can explain the remaining large percentage in the size of the variation. The table below gives an estimated model of the relationship of the number of accidents to both the population and the number of vehicles. The model was as follows:

$$\text{Number of accidents} = 0.002 * \text{Population} - 0.11 * \text{Number of vehicles} - 6809.207$$

This means that each additional one-unit increase in population is associated with an average increase of 0.002 points in the number of accidents, assuming the number of vehicles remains constant, while each additional one-unit increase in the number of vehicles is associated with an average decrease of 0.11 points in the number of accidents, assuming the population remains constant.

For the number of injuries, we considered the number of injuries as the dependent variable, and the number of vehicles, the number of population, and the number of accidents as independent variables, and gave the regression model the following equation:

$$\text{Number of injuries} = 1.422 * \text{Number of accidents} + 0.002 * \text{Population} - 0.007 * \text{Number of vehicles}$$

This means that each additional one-unit increase in the number of accidents is associated with an average increase of 1.422 points in the number of injuries assuming the other variables remain constant, and each additional one-unit increase in the population is associated with an average increase of 0.002 points in the number of injuries assuming the

other two variables remain constant. Finally, each additional unit increase in the number of vehicles is associated with an average decrease of 0.007 points in the number of injuries, assuming the latter two variables are held constant.

As for the number of deaths, there are many studies that tried to model the deaths resulting from traffic accidents when the phenomenon became a serious economic and social burden on the individual and the state. Among the first of these studies is the study of Smeed (1968), Dickey (1978), Jacobs (1986), Zahrani (1998) and others who tried to find mathematical models to know the relationship between the number of deaths, population, vehicles and predicting their size in the future. This made it possible to quantitatively know the most important factors causing the phenomenon, and therefore we find that developed countries that paid attention to this. They were able to reduce these fatalities despite having multiple, dangerous road networks and a large number of different vehicles.

To find the relationship between them and the number of accidents and the number of injuries, standard multiple linear regression gave the following model:

$$\text{Number of deaths} = 0.060 * \text{Number of injuries} - 0.038 * \text{Number of accidents} + 2271.064$$

This means that each additional one-unit increase in the number of injuries is associated with an average increase of 0.06 points in the number of deaths, assuming the number of injuries remains constant, while each additional one-unit increase in the number of accidents is associated with an average decrease of 0.038 points in the number of deaths, assuming the population remains constant. This is natural given that some accidents occur without injuries or fatalities, while the occurrence of injuries may cause direct and indirect fatalities.

5- Traffic safety development strategy:

In order to achieve traffic safety, it is necessary to adopt a strategy that takes into account the three factors that cause traffic accidents and deaths:

5-1- Strategy to develop the human element contributing to traffic safety:

Developed countries from the high income level indicator know a great interest in the aspect of traffic safety, as many countries have achieved a good reduction in traffic accidents, including Singapore, Switzerland, Norway, Ireland, Japan, Sweden, the Netherlands, Poland, Germany, Denmark, Finland and Spain, so most of them work to develop and improve traffic safety levels through studies, research, investment, follow-up, monitoring and guidance, especially from the significant cost they put to preserve their population and society. The traffic safety process includes the activation of several elements, including:

The family: Which is considered the first nucleus of the right upbringing to teach children the basic principles of traffic safety, and from the permanent formation of parents to accompany and follow up with their children.

School: Activating the subject of traffic education and its various applications in the form of practical and periodic models in a smooth and simplified scientific methodology to instill the principles of respect for the law and appreciation of others.

Driving schools: Work on the theoretical side, especially the more practical side, with an advanced international system with high quality training and education and the inclusion of advanced technology in facing and avoiding some risks, allocating teachers and driving trainers who are accredited and easily accessible at all times.

Security organizations: Intensify driver awareness of the dangers of excessive speed and the causes of accidents with awareness programs on the one hand to instill a traffic culture with learning, strict enforcement of laws and deterrence with fines and penalties, and work more to implement legislation related to speed control, use of helmets, enhance visibility, take caution and focus in driving on the road only and put both hands on the steering wheel as well as stay away from cell phones, drinking, eating, smoking, preoccupation with audio and visual effects, talking and passengers disturbing the driver and others.

Media of all kinds: Social media, apps, TV, radio, newspapers, and all kinds of advertisements.

Associations and civil society: Supporting, motivating and encouraging associations of all types and specializations to participate in partnerships and granting civil society areas to carry out activities, outings, awareness campaigns, etc.

Research in the development of knowledge transfer: Studies, research, and contact with advanced and leading countries in the field of traffic safety from the exchange of experiences and experiences and present them to the sustainable development of society.

Civil protection: Working on developing and renewing rapid intervention systems and the use of antennas for critical and remote cases.

Mosque: It plays an important role in establishing the importance of preserving, appreciating and respecting the human soul from respecting the traffic law, diligence, discipline, awareness and a spirit of responsibility for all residents towards traffic safety.

5-2- Vehicle development strategy contributing to traffic safety:

- Reconsider vehicles from age, condition, emission of gases harmful to health.
- Import and manufacture vehicles that meet international standards for the safety of drivers, passengers and road users.
- It is mandatory to equip vehicles with surveillance cameras as well as automatic control for special conditions and driver assistance from the issues of dead spots in vehicles, sudden exit of pedestrians, omissions, drowsiness, fatigue and even patients and people with special needs

5-3- Perimeter development strategy to contribute to traffic safety:

- Prepare a traffic development strategy with time accuracy, features and field solutions and add smart roads and easy crossings to the old road network.
- Rehabilitation of road networks affected by potholes, cracks and wet pavement.
- Renovating traffic lights with the use of laser technologies and lights at night and drawing lines with attention-grabbing lights to take caution and caution for difficult places and in turbulent weather conditions.
- Raise the level of lighting in all areas and establish pedestrian elevators to cross roads or light barriers with modern technologies used in developed countries.
- Increase the facilities for rest, maintenance, prayer, sleeping, eating and drinking, especially on long-distance roads.

Conclusion:

The increase in deaths and injuries resulting from traffic accidents in Algeria is considered a demographic waste and a depletion of the human resource, as the number of traffic accidents and the resulting death indicators record significant figures, in which the human element is the main cause. This is due to the lack of traffic culture, urbanization and overpopulation, especially in cities, with an increase in the number of vehicles, which has caused a weakening of the absorptive capacity of the road networks, especially the main ones, which are experiencing great wear and tear and poor maintenance, in addition to the lack of awareness and expertise among drivers. Therefore, the adoption of a serious strategy that takes into account all the factors causing the phenomenon and brings together all actors, including authorities, citizens and civil society, to develop traffic safety and ensure its realization is a priority that must always be considered, especially since many countries have

been able to reduce the losses resulting from these accidents thanks to the policies they have adopted by placing traffic safety at the heart of their transportation systems.

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