Academic Journal of Engineering and Technology Science
ISSN 2616-5667 Vol.3, Issue 1: 20-25, DOI: 10.25236/AJETS.2020.030104

Analyzing the Principal Factors Influencing Highway Traffic Safety

Jingbo Sun

Graduate Training Regiment, Logistics University of PAP, Tianjin 300309, China
Email: 409639073@qq.com

ABSTRACT: *At present, traffic safety has become an important factor in the operation and management of expressways, and it is imperative to curb the growth of expressway traffic accidents. This article aims to analyze the deep-seated reasons that affect expressway traffic safety from the two aspects of expressway traffic accident characteristics and influential factors of expressway traffic safety.*

KEYWORDS: *highway; traffic safety; accident analysis*

With the rapid development of expressways, the number of passing vehicles has increased rapidly. While the advantages of large flow and high speed on the expressway are fully reflected, safety issues are gradually exposed. For more than a decade, the severity of highway accidents has continued to increase, seriously endangering the lives of people and property. How to ensure the safety of traffic under the premise of large flow and high speed, and give full play to the economic benefits of expressways are the most important issues that need to be resolved. With the rapid growth of expressway mileage, the expressway network gradually assumes the task of transporting trunk lines, and expressway transportation has now become an important part of the integrated transportation system.

1. Highway traffic accident characteristics

1.1 Accident time distribution characteristics

The time distribution characteristics of freeway traffic accidents can be understood by analyzing the distribution of traffic accidents in different months and at different times of the day.

According to relevant statistics, the incidence of traffic accidents on highways is highest in July and August, and the proportion of serious and catastrophic traffic accidents is also more significant. The fatality rate is also the highest throughout the year. After analysis, this is because the driver is affected by the hot summer weather and is prone to drowsiness and fatigue during driving. At this time, the ground

ISSN 2616-5667 Vol.3, Issue 1: 20-25, DOI: 10.25236/AJETS.2020.030104

temperature is very high and it is easy to cause a flat tire, which will cause a series of traffic accidents.Affected by the daily life of people, the traffic volume on the expressway is different at different times of the day. From the daily accident distribution characteristics, it can be seen that the number of accidents on the highway during the day is often more than that at night, but at night The death toll is even more, especially during the period from 10 pm to 5 am, the death toll caused by the accident accounted for 40% of the total accident. Relevant research shows that although the traffic flow on the highway decreases at night, the speed is much faster than that during the day. Once a traffic accident occurs at night, it is generally a major accident, so it causes a large number of deaths.

In addition, during the holidays such as the Spring Festival transport and the 11th Golden Week, highways are free of tolls and other holidays. Vehicles travel intensively, and the traffic volume is large, which is prone to major traffic accidents.

1.2 Distribution of accident patterns

The specific form that a traffic participant shows from his own out-of-control accident and conflict with other traffic participants is called a traffic accident pattern. China's road traffic safety regulations stipulate that the main forms of road traffic safety are collision, rolling, crashing, scraping, overturning, and fire.

A detailed analysis of the traffic accident patterns on the expressway can find the main cause of the accident as soon as possible, so as to work out a detailed solution to prevent accidents, which is of great significance to reduce casualties and economic losses.The data show that rear-end collisions and collision fixture accidents are the main forms of traffic accidents on China's highways, and the probability of occurrence is much higher than other types of accidents. This is because under normal circumstances, the sightline of the expressway is good, and the road conditions are straight, so it is easy to cause the driver to neglect safety issues and drive at high speed.

When speeding or fatigued on the highway, the driver often cannot take timely measures against the sudden situation, so it is easy to cause a vehicle collision with a fixed object and a rear-end collision accident. The number of accidents and deaths caused by rear-end collisions accounted for about 1/3 and 1/2 of the total; the number of accidents and deaths caused by collision with fixed objects accounted for about 1/4 and 1/10 of the total.

1.3 Distribution characteristics of accident models

In recent years, the number of small cars in China has increased year by year, resulting in the number of traffic accidents caused by minibuses on the highway also increased year by year, has become China's highway accidents the most frequent models, accounting for 1/2 of the total number of accidents. Second, heavy goods vehicles, heavy goods vehicles caused by the increase in traffic accidents related to traffic flow characteristics, accounting for about 1/4 of the total number of accidents.

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Although the total number of accidents caused by passenger cars on the highway is much higher than the number of accidents caused by large trucks, but because of the size of the truck, the speed is fast, once the traffic accident is often a major accident, so the number of accidents in the number of deaths and severity are much higher than the bus.

2. Analysis of the factors influencing highway traffic safety

The highway traffic system is mainly composed of people, cars, roads and traffic environment. In this dynamic system, each element needs to coordinate with each other to ensure the normal operation of the system, any element of the incongruity and imbalance will affect the normal operation of the whole system, and even lead to traffic accidents. Traffic accidents on highways are the product of a combination of factors, so we need to analyze people, vehicles, roads and traffic environment when we look for the causes of highway traffic accidents.

2.1 People factor

People are the most active and active factors among highway traffic safety factors, and they are also the most important factors that cause traffic safety problems. China's highway traffic regulations clearly stipulate that driving vehicles are not allowed to turn around or retrograde on the highway, but some vehicle drivers do not pay attention to this provision, often on the highway to carry out dangerous turn or retrograde operation, and these violations will seriously affect other vehicles that were othernormal driving. In addition, some vehicle drivers due to their lack of a certain sense of traffic safety, usually do not comply with the speed limit, blindly drive fast, resulting in many accidents that should not occur. After analysis, the behavior of drivers causing traffic accidents can be divided into the following aspects: (1) the driver in the emergency operation is improper. (2) The driver is speeding. (3) Driver fatigue driving. (4) The driver's driving distance is not enough. (5) The driver is negligent in the course of driving. (6) Other illegal driving behavior mainly includes: illegal reversing, illegal parking, illegal overtaking, illegal lane change, illegal turn,illegal lying, illegal loading, reverse driving and so on. The driver's driving technology, mainly composed of a series of operation activities and intellectual activities, is to ensure the driver's successful completion of the driving task of a set of action system. In the early stages of driving, the average driver will take a cautious attitude, so the probability of accidents is relatively low, but in the driving age of one or two years, the driver is prone to because of their own technology too confident and reduce the degree of caution, thereby increasing the probability of accidents. With the gradual increase of driving age, the driver's driving skills and proficiency are also gradually improved, and his ability to judge and adapt in driving activities has reached a certain level, so the probability of accidents at this stage will gradually decrease[1].

When the roadside area is more monotonous and lack of stimulation, the sensitivity of the vehicle driver is often relatively low, and his thought is easily

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transferred to some events that have nothing to do with road traffic, and this manifestation of inattention greatly increases the probability of traffic accidents. Coupled with long-term fatigue driving, so that some large trucks and coaches, private car drivers in the face of dangerous situations, can not make a correct, rapid emergency response, so that traffic accidents occur.

2.2 Vehicle factor

Vehicle is an important part of highway system, and there is a close relationship with traffic safety, which is an important factor in highway traffic safety. Vehicles in the high-speed driving process will be correspondingly reduced in safety performance, highway speed than other highway level higher, in the case of high-speed driving, the vehicle is more likely to malfunction, and some of the vehicles themselves can be poor, it self-risk sits there is a certain safety hazard. At this time, once the vehicle appears, the driver is prone to lose control of the vehicle, at this time the occurrence of tailings, collisions and other common accidents more. Such accidents due to the performance of vehicles account for a large proportion of highway traffic accidents.

Vehicle overload causes great impact on highway traffic safety, easy to cause traffic safety hazards, because overloading transportation will cause the vehicle to be overloaded for a long time, will lead to the vehicle braking and stability and other safety performance quickly reduced, easy to cause traffic accidents. According to the survey data, at least 80% of the traffic accidents caused by heavy goods vehicles are caused by overloaded vehicles, and 50% of the mass deaths and serious accidents are directly related to vehicle overload. It can be said that vehicle overload transport has become the "first killer" of traffic safety, seriously threatening the safety of people's lives and property.

2.3 Road factor

The driver's wrong driving behavior is the main factor causing road traffic accidents, however, the road conditions have some influence and interference on the driver's driving behavior, and the road traffic environment includes the most basic road traffic facilities such as road surface quality, road line design, traffic signs and line signs. Reasonable road traffic environment can provide drivers with fast and accurate traffic information, guide drivers to make correct and reasonable judgment, on the contrary, unreasonable road traffic environment will bring traffic safety hazards.

The research shows that the larger the curvature of the horizontal surface curve of the highway, the higher the probability of accident, and when the curvature of the flat curve is greater than 10 degrees, the road traffic accident rate will increase sharply. Similarly, the road vertical curve for driving safety also has a certain impact, when the vertical curve radius is too small, will cause the driver's field of view to decrease, the line of sight is reduced. Traffic safety is not only related to flat line

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shape and slope, but also closely related to the coordination of line combination. For example: long straight section at the end of the small radius curve, long downhill slope bottom to a small radius flat curve, linear mutation, road continuous bending, will cause the driver's visual overload, the top of the uphill slope sharp bend, will cause discontinuous line of sight, causing the driver's doubts, concave curve too short will also produce visual errors, Causes the driver to estimate the uphill too steeply, and these incoherent linear combinations are prone to accidents. Highway road in the face of traffic safety has a great impact, road strength and stability, road flatness, road surface anti-slip and road diseases for highway traffic safety have a great impact. The strength and stability of the road surface mainly refers to the ability of the road surface to resist deformation, wear and crush under the influence of driving and natural factors. The higher the intensity, the better the stability of the road surface, the more able to adapt to the complex composition of the model and the external environment, but also to ensure driving safety and comfort. The road surface strength is not enough, which will cause some road diseases and worsen the road environment, which will lead to traffic accidents[2]. For example, substandard asphalt pavements can crack at low temperatures.

It is generally believed that road traffic accidents are more likely to occur on uneven road sections, but the results of the study are quite the opposite, road traffic accidents in the plane and profiling geometric characteristics of good road sections are more likely to occur. The main reason is that there are craters or uneven road sections on the road, the driver will appropriately reduce the speed, increase vigilance, drive carefully, while the road surface flat section will relax vigilance, improve the speed. Therefore, in the long downhill section can be set up deceleration belt and other traffic safety facilities to reduce the speed, reduce the occurrence of road traffic accidents[3].

2.4 Traffic environment factor

Traffic environment is another factor that has an important impact on highway traffic safety, in addition to people and traffic. Bad weather and traffic volume are closely related to traffic safety. Under bad weather conditions such as rain, fog, wind and snow, the danger of vehicles driving on highways is great. In bad weather, visibility is low, the driver's line of sight is affected, the judgment ability is reduced, easy to cause driving operation error. At the same time, the bad weather caused by the road surface anti-slip performance of the decline will also lead to traffic accidents.

The research shows that when the traffic volume is small, the road surface is relatively empty, and the spacing between vehicles is larger, in which the interaction is small and the driving freedom is high environment, the vehicle's driving speed is generally faster, which directly leads to the driver in an emergency can not dodge and cause traffic accidents; The actual utilization rate of the road will increase, so the interference between vehicles will increase, the driver's vigilance will gradually increase, its driving behavior will be more cautious, so the number of accidents is relatively reduced, while the traffic volume continues to increase and lead to

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traffic[4].

3. Conclusion

Aiming at the highway safety problem, this paper studies the reasons for the safety from the two aspects of highway traffic accident characteristics and highway traffic safety factors. The results show that people's own factors and some external factors will affect traffic safety. The analysis results of this paper have some guiding significance for highway driving under the actual situation.

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