



Factors of Fatigue on Long-route Drivers in Bangladesh

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Keywords

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Abstract

In various studies, driver fatigue is a major contributing factor to fatal road accidents. In Bangladesh, road accidents and fatalities increased by 13.43% and 15.7% respectively, in 2021 compared with 2020. It is growing substantially and frighteningly, resulting in a significant loss of life and resources. Drivers in Bangladesh are more likely to have fatigue-related accidents, which increases their vulnerability on the social and economic aspects as well as their probability of becoming disabled. This study was conducted in three districts (Dinajpur, Gaibandha, Rajshahi) which are northwest region of Bangladesh. In these, study 103 drivers of long route above 400km were interviewed through discussions to gather information on drivers, such as their age, driving history, economic conditions, the times of day when they are most likely affected by fatigue, causes of fatigue, and suggestions from their perspective. The study found 17 factors and the most important factors are lack of sleep (17%), traffic jams (8%), police harassment (8%), bad road conditions (13%), daytime driving restriction (1%) and drug consumption (1%). This study will assist policymakers in creating an environment to adopt appropriate preventive measures to reduce fatigue induced accidents.

1. Introduction

Human fatigue is a threat to safe transport. It causes economic, health, and environmental costs [1]. It is an inevitable problem among drivers due to many factors. Transportation workers are prone to falling asleep while driving, feeling tired and drowsiness, prolonged mental and physical effort, and sleep deprivation, which will later result in fatigue. The most significant risk factors for fatigue were poor quality and quantity of sleep, a stretch driving during the day, and work-related factors [2]. In the transportation industry, fatigue is known as one of the work-related hazards that can be linked to road crashes and fatalities, particularly among long-haul transportation drivers. Driving fatigue is considered more severe among professional drivers, such as truck drivers because they are vulnerable to sleep loss, prolonged driving, circadian rhythm disruption, and working stress related to high-time pressure journeys [3]. Fatigue is one of the significant factors for fatal accidents in Bangladesh. In Bangladesh, heavy vehicle drivers are prone to frequent fatigue-related accidents, thus increasing disability and social and economic vulnerability [4]. The number of fatalities in road accidents continues to climb, reaching 1.35 million in 2016. According to estimates, it is the eighth largest cause of mortality globally and the leading killer of persons aged between 5 and 29. More people now die in road accidents than from HIV/AIDS. 93% of the world's fatalities in road crashes occur in low and middle-income countries. Road accidents cost most countries 3% of their GDP [5].

As many as 6,284 people were killed in 5,371 reported road accidents across the country in 2021, according to Road Safety Foundation (RSF). According to the report, 7,468 people suffered injuries in road accidents. Some 798 drivers and their assistants also lost lives in road crashes (12.69% of the total deaths). The number of road accidents and fatalities increased by 13.43 percent and 15.7 percent, respectively, in 2021 compared with 2020 [6]. According to a survey, 83% of

Bangladeshi drivers had psycho-social issues and were directly or indirectly affected by fatigue [4].

Between 2005 and 2008, professional bus and truck drivers' fatigue caused seven out of 44 catastrophic traffic incidents [7]. As a result, driving while fatigued is a severe problem in industrialized and developing nations, including Bangladesh. However, a few studies have been conducted on this topic. According to research, Bangladeshi drivers are aware of fatigue but are unaware of its primary causes and effects [8].

Since, compared to developed nations, very little research has been undertaken in developing countries like Bangladesh, this study will also help advance knowledge on the subject [9]. Some contributing elements discovered in affluent nations may have distinct consequences in developing countries because the road environment, driver behavior, and vehicle type are considerably different. It will offer evidence-based suggestions for preventing driver fatigue and reducing fatal or major traffic accidents caused by fatigued drivers.

Additionally, some characteristics that have, up to this point, gotten relatively little attention in the literature will be examined in this study. Just about the research alone has essential information regarding the causes of driver fatigue. The previous study was conducted in Dhaka, Bangladesh, and this study was performed in the northwest part of the country. The reason was to observe data variation as this region is the warmest region of the country from June-August, and these are the warmest months of the year in Bangladesh [10].

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2. Methodology

The primary approach of the study was a questionnaire survey. The survey was conducted in Bangladesh in three locations (Doshmile, Gaibandha, and Rajshahi). Doshmile was chosen because it connects the country's longest route (Teknaf-Tetulia). It is the hub point of roadway communication in the region. The other two points were for the variety of the data expected. Our survey was conducted in June-August of 2022. All the data was collected when the drivers were at ease in their minds. The same questionnaire was prepared for all the drivers, and it was made sure that they understood the questions correctly. During their off-duty hours, the drivers were asked questions, and discussions were made to make them understand the questionnaire. They were given a brief on fatigue and the purpose of the study. The drivers are not accustomed to these kinds of surveys and are frightened at some level; hence they were persuaded that the data would not be used against them at any stage and that individual data would not be published publicly. Because of the insecure feeling, some drivers denied participating in the study. It took about 15 minutes for a driver to complete a questionnaire survey. Data was collected by writing in a notebook in real-time, and audio recordings were made. Later on, when the transcription was made, the tapes were checked to see if any data was missed. In general, about six drivers were interviewed in a day. Asking in a group of drivers was avoided later on as in those cases, data seemed persuaded and verity less. The questionnaire was kept very flexible for the drivers.

The primary purpose was to collect data from long-route drivers and finding out the factors and typical periods of fatigue. Also identify preventative strategies to lower the incidence of fatigue. The questions were asked: their name, age, driving experience, number of breaks in the individual trip mobile number, and so on. Every driver was asked about the causes of fatigue and suggestion. The data of the drivers who have driven less than 400 km has not been counted in the study. In the survey, 66% of the drivers drove more than 500 km. The truck driver's data were the main target of the study. All the total data collected were male, and none of them was below the age of 18. A total of 103 drivers were interviewed, including truck and bus drivers.

3. Results

The study was focused on finding out all the possible causes of driver fatigue. In this study, all the reasons mentioned are according to the driver's opinion. That is why experienced drivers' opinions were preferred. In the survey, 61% of drivers had 06-20 years of driving experience, and 20% of the drivers had experienced less than five years that is shown in figure 1.

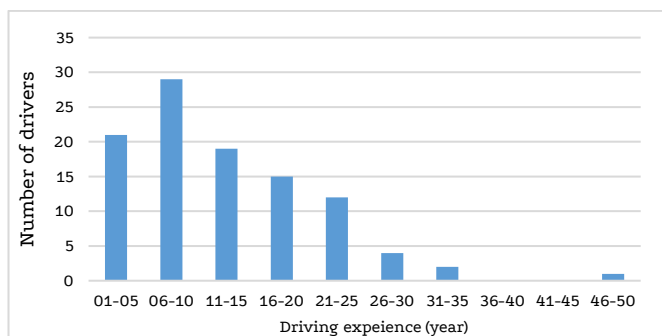


Figure 1. Driving experience

77% of drivers are aged between 21-40 years that is shown in figure 2.

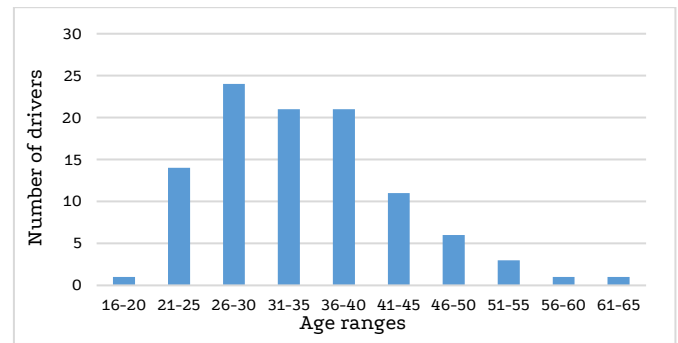


Figure 2. Ages of drivers

Only 12% of the vehicles were buses, and the other 88% were trucks (covered vans, large trucks, medium trucks, and mini trucks). In this survey, it is observed that most of the drivers have good economic conditions. About 61% of drivers said their approximate monthly income was 21,000-30,000 BDT. However, about 33% said they were in poor financial condition. The study finds that none of the drivers faced pressure from the owner of the vehicles except all perishable goods transportation drivers and bus drivers. Perishable goods transportation drivers face driver fatigue the most. Reckless driving was common among these drivers. In the study, 80% of the drivers said fatigue attacked the most in the late night, the dawn, or from late night to dawn. The drivers pointed out various causes in the survey that is listed in table 1 and its results are shown in figure 3. As the study's primary purpose was to find out the causes of driver fatigue, the mentioned causes do not indicate the most probable cause.

Table 1. Causes of driver fatigue

Serial No.	Causes of fatigue according to drivers	No. of drivers
01	Lack of sleep	30
02	Traffic jam	43
03	Police harassment	14
04	Condition of vehicles	4
05	Weather condition	7
06	Bad road conditions	22
07	Excessive headlight effect	6
08	Prevalence of low-speed traffic on highways	6
09	Inconsistent eating	8
10	Low-income frustration	2
11	Shortage of parking places and harassment	6
12	Extortion on the road	3
13	Driving at a stretch and tiredness	16
14	Pressure of owner	5
15	Headache and Back pain	2
16	Daytime driving restriction	1
17	Drug consumption	1

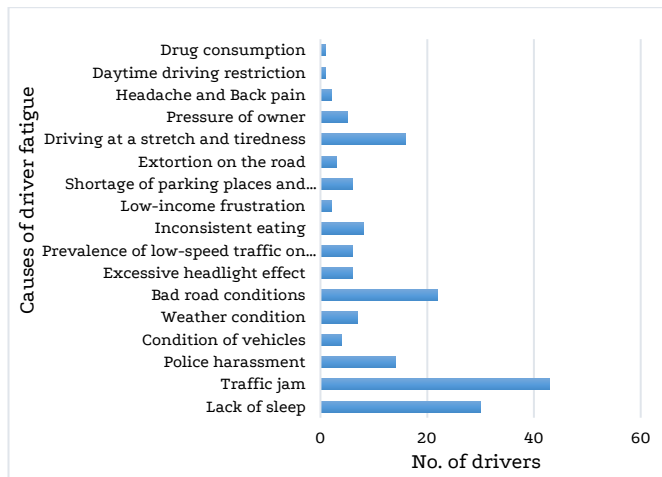


Figure 3. Causes of driver fatigue

3.1. Lack of sleep

Lack of sleep was widespread in the study among truck drivers in Bangladesh. The truck drivers drive the vehicle and search for the next trip. Sometimes they did not get enough sleep in between two trips. The helping person stays with the drivers does participate in any work but cleans the vehicles and helps in small chores. Having an accident was strongly associated with tiredness and having the eyes drop shut while driving. Lack of enough sleep or having disrupted sleep are all prime contributors to fatigue, which decrease an individual's performance [11].

3.2. Traffic jam

It is a severe problem on the roadways of Bangladesh. Because of traffic jams sometimes two-five times the time is required. Most drivers mentioned it in the survey as a primary cause of fatigue. Drivers cannot get out of the vehicles to take a rest or to eat. They try to Over-speed as soon as they get out of a traffic jam. It initiates recklessness in drivers' minds to cover up the wasted time by being trapped in the traffic jam.

3.3. Police harassment

Police harassment happens in both right and wrong ways, according to the drivers in the survey. Sometimes police ask for papers and questions for security reasons, and consequently, the steady driving gets abrupted. Another case is when the police person is corrupted. They stop the vehicles deliberately to collect illegal subscriptions. They harass the drivers for parking beside the roads. Truck owners said that most of the time, they were unaware of how much loading their vehicles carried and were paying the police more for overloading.

3.4. Condition of vehicles

Almost all the 40,000 trucks running throughout the country carry weights more than twice the capacity. According to the Bangladesh Road Transport Authority (BRTA), RHD, and Transport Owners and Workers Association, each five-tonne and seven-tonne truck carries up to 15 to 20 tonnes [12]. Overloading vehicles generate heat from the engine. The driver gets affected by fatigue. Consequently, long period of driving becomes tough. As well as the speed of the vehicles is kept under average to manage the engine's capacity. Another major problem in the study was that some vehicles' bodies were not in proper measure. The body of the vehicles was larger than the capacity of the engines. The improper size of the vehicles is a common issue of police harassment. Nevertheless, the owner intended to pay fines rather than making the proper size body of the vehicle.

3.5. Weather conditions

Location of Bangladesh is in the tropical monsoon region, and its climate has a high temperature, heavy rainfall, often excessive humidity, and fairly marked seasonal variations [13]. In hot weather

conditions, the driver gets affected by fatigue. Again, sunrays raise the level of fatigue. Usually, when the sun rises and sets, the sun's rays directly fall upon the drivers. It makes the drivers uncomfortable. Some drivers said in the survey that they faced problems when it rained cats and dogs.

3.6. Bad road conditions

It is a factor of driver fatigue [14]. Around 25 percent of the country's roads, managed by the Road and Highways Department (RHD), are in "poor, bad, or very bad" shape, according to an RHD survey on 17,452 km of roads by March 2022 [15]. Twenty-two of surveyed drivers mentioned bad road conditions as a fatigue-producing factor.

3.7. Excessive headlight effect

The drivers in the survey mentioned excessive light coming towards them from the opposite side vehicles as a factor of fatigue. This excessive light directly falls upon their eyes. Exposure to bright light sources at night was a reason for aviation accidents. After being distracted by bright light sources, a driver may lose their ability to judge height and distance properly [16].

3.8. Prevalence of low-speed traffic on highways

Low-speed vehicles ply the roads along with heavy and high-speed vehicles. Hence, heavy vehicle drivers have to break now and then. It hampers the steadiness in the speed of the vehicles. It raises fatigue, according to the drivers surveyed in the study.

3.9. Inconsistent eating

Most drivers said in the study that they consume healthy food regularly, but the consistency of time cannot be maintained most of the time. They think that it predominantly affects driver fatigue. The primary reason for irregular eating was the need to get to the destination quickly, as many factors caused delays, and the reason for low-calorie food consumption was the lack of income and a high need for family expenses. The drivers make an effort to cut their everyday costs. The low-calorie, mal-nutrient food also includes infectious microorganisms. Most drivers pull over near roadside restaurants or shoddily constructed temporary shelters whenever they get time to take irregular food. Drivers get tired and exhausted from inconsistent eating. They also have a problem with access to clean, safe drinking water. Lack of facilities for a healthy diet frequently causes fatigue.

3.10. Low-income frustration

The study found that 33% of the surveyed drivers had a monthly income of less than 20,000 BDT. Again, 72% of the drivers did not get to go home to spend time with their families. Many drivers sleep inside the vehicle because of the unavailability of cheap rest houses [4]. Most of the drivers in the study did not have fixed salaries, and they were paid per trip. Every trip had variable costs usually fixed by bargaining. Moreover, of that, they had to manage the upcoming trip.

3.11. Shortage of parking places and harassment

According to the surveyed drivers, there was a massive parking space shortage. They could not park here and there because of safety issues. Again, they could not park the vehicles besides the highways. The police occasionally harass even if they park the vehicles for emergency reasons. Other than that, they lack proper sanitation and bathroom for the shortage of parking places.

3.12. Extortion on the road

Extortion on the road happens in various forms in the name of owners and labor organizations [17]. These extortions are the main reason for the disruption of the road and shipping system and terrible traffic jams on roads [18]. The drivers said in the study that, because of these extortions, they had to make numerous stops on the road. It disrupts driving. Again, most of the time, the owner did not give financial support when the driver had to give the money as extortion.

3.13. Driving at a stretch and tiredness

Most truck drivers drive for long hours, which means sitting in one place for an extended period, which subjects the body to stress due to poor blood circulation in lower limbs and static muscular contraction. Many long-haul drivers face chronic partial sleep deprivation. The leading cause of road accidents is tiredness. Driving long hours is a prime contributor to fatigue, which will, without a doubt, decrease an individual's performance [11].

3.14. Pressure of owner

All the bus and perishable goods transportation drivers in the study mentioned the owner's pressure contributing to driver fatigue. Drivers under pressure are at risk of endangering themselves and other vehicles. They have a higher propensity for road rage. Driving in a stressful condition may quickly develop anxiety into a rage and drive more aggressively.

3.15. Headache and Back pain

The drivers mentioned headaches and back pain as health conditions that affected them while driving. They said in the study that back pain usually generates from long driving. They also mentioned that lack of freshness, not having a bath for a few days, and falling sun rays directly on their eyes are the common reasons for headaches the drivers.

3.16. Daytime driving restriction

In a few cities of the country, daytime truck driving was restricted. According to the drivers, this regulation is troublesome when they are a few hours short of reaching a truck parking place. To reach the parking place, they over-speed the vehicles.

3.17. Drug consumption

Drugs and alcohol are widespread among drivers [19]. Drugs are frequently detected in accident-involved drivers. Usually, young drivers are more associated with drug driving aged under 35 [20]. The drivers in the study think that drug consumption reduces their alertness.

4. Discussions and Recommendations

Awareness is very much needed in minimizing driver fatigue. Many drivers suggested taking a rest when possible rather than wasting time gossiping, watching TV, playing, and browsing the internet. Awareness should be increased to make them understand that taking rest is a part of safe driving. For the drivers finding trips is another job to do. For that, they often had to look for the trip without rest. Drivers suggested that overloading and slow-speed vehicles on the Highway must be restricted, and illegal subscriptions or tolls need to be eradicated through law enforcement.

In the questionnaire survey, every driver was asked about their suggestion for reducing fatigue. They said about minimizing the causes of driver fatigue mentioned in the study. They asked for help from governmental and non-governmental institutions to raise awareness among the drivers. Regarding perishable goods transportation, two drivers should be in vehicles. The flexibility of the drivers is needed on long routes at a stretch driving. Some drivers suggested that some sleep at night gets them fatigue-free. Help from the driver's assistant is necessary. Some driver emphasized mental freshness as the surveyed region is the warmer region of the country. They suggested bathing regularly and drinking tea for alertness.

5. Conclusions

Many factors can affect driver fatigue, but significant causes are traffic jams, lack of sleep, bad road conditions, and driving at a stretch. The study finds 17 causes affecting fatigue. Among them 5 factors are new from Talukder et al., 2013 [4]. The five new factors are lack of sleep, bad road conditions, weather conditions, day time driving restriction and inconsistent eating. These are not considered in Taluder et al. 2013 because they conducted short distance travelling drivers. So, drivers should not drive in the light period. Drivers with alternate work schedules are less likely to increase fatigue and break the law, but drivers with continuous schedules may be much more at

risk of accidents, collisions, and breaking the law and get fatigued. It is also revealed that being stalled in a traffic jam is annoying, stressful, and frustrating, especially when a driver is in a hurry to get to work or a destination on time due to the owner's pressure. Poor road conditions can affect driving performance, which might be an initial cause of road accidents. Roads can degrade to the point that they become unsafe. This includes road fractures, sinkholes, cracked concrete, uneven road surfaces, exposed rebar, and potholes. A colossal pothole might shatter a tire, sending the vehicle careening into another lane and colliding with another vehicle. The study found that drivers experience physical and mental exhaustion due to their constant extended driving obligations. International Labour Organization (ILO) recommends a break in 4 hours of continuous driving and driving duration should not be over 9 hours daily or 48 hours weekly [21]. The government should consider reducing traffic jams and bad road conditions. Awareness should be increased as encouraged to stop and take a break when they feel fatigued.

6. Scope of Future Study

In the study, various new aspects were observed. They can be studied further for future studies.

- This survey was conducted with 103 drivers. If a survey was conducted on a larger scale, more causes of fatigue could be identified.
- Some vehicles' bodies were found to be improper-sized according to the regulation. A study can identify the number of improper-sized vehicle bodies across the country.
- If the drivers are interviewed, mentioning all the causes of driver fatigue, it is possible to identify which factors have the most impact. The drivers always seemed in a hurry. Hence, the survey duration of each driver should not be lengthy, and the questions should be to the point. Data should be collected from an individual driver at a time. Maybe it is not possible to collect realistic data among a group of drivers.
- The study's data may be used to analyses driver fatigue causes and how it affects traffic violations using the Log Linear model, The Poisson Regression Model, Negative Binomial Model, etc. The data used in this study can be used to create various models, including travel pattern models, travel demand models, trip generation models, simulation models, mode choice models, etc.

In the survey, the main problem was collecting data from the drivers. All the drivers seemed anxious about sharing data. Each time they were convinced that these data would not harm their livelihood. That is why the questionnaire part had to be short, and only focus was given to finding out the causes of driver fatigue rather than the most affecting causes.

Declaration of Conflict of Interests

The authors declare that there is no conflict of interest. They have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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