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Understanding Work Environments of the Truck Drivers its Influence on Physical Fatigue

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Abstract: - The purpose of this study is to comprehensively understand the work environments of truck drivers and their influence on physical fatigue. By exploring factors such as prolonged driving hours, sleep quality, environmental stressors, and regulatory frameworks, the study aims to identify key determinants of physical fatigue among truck drivers, particularly in the context of India. Ultimately, the study seeks to provide insights that can inform interventions, regulatory reforms, and improvements in workplace conditions to enhance the safety and well-being of truck drivers. The study followed an observational cross-sectional analytical research design, employing a quantitative approach to data collection. Data was collected from 300 truck drivers operating on major National Highways, focusing on freight routes covering specific regions in India between November 2022 to June 2023. A structured questionnaire was applied to collect information on demographic factors, work conditions, and fatigue levels for Fatigue Severity Scale (FSS) were applied. Probability proportional to size (PPS) sampling method was applied to determine the sample size, ensuring representation across various trucking routes. Descriptive statistics and multivariate logistic regression analysis were used to analyse the data, identifying associations between independent variables and fatigue levels among truck drivers. The paper findings provide valuable insights for stakeholders, including policymakers, industry regulators, and trucking companies, to develop targeted interventions and regulatory reforms aimed at mitigating fatigue-related risks.

Keywords: Fatigue and sleep deprivation, long-haul truck drivers, physical fatigue, multi axel truck, occupational risk factors, work environment, environmental stressors, mental health

1. Introduction

Trucking Environment

The trucking industry holds a major place in the global economy by facilitating the movement of goods and materials across substantial distances. Often referred to as the backbone of logistics, trucking creates an essential link in the supply chain, connecting manufacturers, distributors, and retailers.

The trucking environment incorporates a diverse set of elements, ranging from the vehicles themselves to the infrastructure, regulations, and the people involved in the industry. Understanding the trucking environment involves recognizing the interconnected nature of its components and adapting to ongoing changes in technology, regulations, and market dynamics. As the industry evolves, it continues to play a major role in facilitating the movement of goods and contributing to the functioning of a globalized economy (Sharma & Tripathi, 2022).

Physical Fatigue

Physical fatigue refers to a state of extreme tiredness and a decline in physical performance that results from prolonged physical activity, mental exertion, or a combination of both. It is a normal response to strenuous

activities and is often relieved by rest and proper recovery. However, persistent, or chronic physical fatigue can be a symptom of various underlying health issues.

Common causes of physical fatigue

Physical Exertion and Poor Sleep

Engaging in intense or prolonged physical activity without adequate rest can lead to muscle fatigue and a sense of overall tiredness. Research by Folkard and Lombardi (2010) focuses on the effect of extended work hours on injuries and accidents, looking on how extended periods of work contribute to physical fatigue and its consequences in terms of safety and well-being (Lombardi et al., 2010).

Inadequate or poor-quality sleep can contribute to physical fatigue. The body requires sufficient rest to repair tissues and restore energy levels. Shift work often leads to disruptions in sleep patterns, contributing to physical fatigue. Few articles state the relationship between sleep loss, fatigue, and the challenges associated with shift work (Lombardi et al., 2010).

Stress and Anxiety

Mental stress and anxiety can manifest physically, leading to fatigue. Chronic stress can contribute to muscle tension and overall feelings of exhaustion.

Dehydration and Nutritional Deficiencies

Lack of proper hydration can impair bodily functions, leading to fatigue and a decrease in physical performance. Insufficient intake of essential nutrients, such as vitamins and minerals, can result in fatigue. Iron deficiency anaemia, for example, is known to cause fatigue.

Medical Condition, Medications and Lifestyle Factors

Various medical conditions, such as chronic fatigue syndrome, fibromyalgia, thyroid disorders, and autoimmune diseases, can lead to persistent physical fatigue.

Some medications may have fatigue as a side effect. It's important to be aware of the potential impact of medications on energy levels. Unhealthy lifestyle habits, such as a sedentary lifestyle, poor diet, and excessive use of stimulants like caffeine, can contribute to physical fatigue.

Driving Environment and Physical Fatigue Among Truck Drivers- A Global Scenario

The transportation industry plays a crucial role in the global economy, with truck drivers serving as the backbone of freight movement. However, the demanding nature of their profession, coupled with extended periods of driving and challenging working conditions, raises concerns about the association between the driving environment and physical fatigue among truck drivers. To have a comprehensive overview of existing research on this issue, here are discussed the factors contributing to physical fatigue among truck drivers and potential interventions to address these issues.

Factors Influencing Physical Fatigue

Prolonged Driving Hours

One of the primary factors contributing to physical fatigue among truck drivers is the extended duration of driving hours. Research by Merrill and Mitler et al. (1997) has highlighted the negative impact of prolonged driving on alertness and overall driver performance(Errill et al., 1997). This finding emphasizes the need to explore regulations and policies governing maximum driving hours to mitigate the risk of physical fatigue.

Sleep Quality and Quantity

Inadequate sleep is a prevalent issue among truck drivers and has been linked to increased physical fatigue. Studies by Chattu et al. (2018) and Pandit-Perumai et al. (2018) underscore the importance of addressing sleep disorders and improving sleep hygiene to enhance the overall well-being of truck drivers(Chattu et al., 2018).

Environmental Stressors

The driving environment itself can contribute to physical fatigue due to factors such as traffic congestion, adverse weather conditions, and road quality. Czeisler et al. (2016) found that environmental stressors negatively impact driver alertness and increase the likelihood of fatigue-related incidents. Understanding the specific stressors in the driving environment is crucial for implementing targeted interventions.

Noise, temperature extremes and mechanical vibrations contribute to challenging physical conditions. The schedule of commercial drivers may include irregular shift work, night-time driving, and inconsistent days off. The combination can lead to stress, fatigue and sleep deprivation that affect driver performance ((Gregory M. Saltzman and Michael H. Belzer, 2007).

Technological Interventions

Driver Assistance Systems

The integration of advanced driver assistance systems (ADAS) has shown promise in mitigating physical fatigue among truck drivers. Research by Spicer R and Vahabaghie A (2018) demonstrates that technologies such as lane departure warning systems and adaptive cruise control contribute to improved driver alertness and reduced fatigue(Spicer et al., 2018).

Fatigue Monitoring Technologies

In recent years, there has been a growing interest in fatigue monitoring technologies that aim to detect early signs of driver fatigue. Studies by Raj, John, and Verghese (2018) explore the effectiveness of wearable devices and in-cab monitoring systems in identifying fatigue-related patterns and providing real-time alerts.

Regulatory Frameworks and Policies

Hours of Service Regulations

Regulatory frameworks, such as the Hours of Service (HOS) regulations, play a vigorous role in managing driving hours and preventing excessive fatigue among truck drivers. A review by Belzer and Rodriguez (2005) evaluates the impact of HOS regulations on driver fatigue and recommends adjustments to enhance their effectiveness.

Workplace Health and Safety Programs

Incorporating comprehensive workplace health and safety programs specific to the trucking industry is essential. Research by Bigelow et al. (2019) emphasizes the role of proactive safety measures, including driver education, ergonomic improvements, and health promotion initiatives, in reducing physical fatigue and enhancing overall well-being.

The association between the driving environment and physical fatigue among truck drivers is a multifaceted issue influenced by factors such as prolonged driving hours, sleep quality, environmental stressors, and regulatory frameworks. By understanding the intricate dynamics between the driving environment and physical fatigue, stakeholders can work collaboratively to create a safer and healthier working environment for truck drivers.

Driving Environment and Physical Fatigue: Among Truck Drivers in India

Truck driving is a demanding occupation that exposes drivers to various physical and environmental challenges. One critical aspect affecting the well-being of truck drivers is the driving environment. The association between driving environment and physical fatigue among truck drivers in India has become a growing concern, given the country's extensive road network and the crucial role played by the transportation sector in the economy. This section aims to explore and synthesize existing research on the relationship between the driving environment and physical fatigue among truck drivers in India(Sharma & Tripathi, 2022).

Extended Driving Hours and Fatigue

Truck drivers in India often face long and arduous journeys due to the vast geographical expanse of the country. Prolonged driving hours have been consistently linked to increased levels of physical fatigue (Lau et al., 2018).

These extended periods behind the wheel contribute to sleep deprivation, reduced alertness, and overall diminished physical well-being among truck drivers (Lau et al., 2018).

Road Infrastructure and Driving Conditions

The quality of road infrastructure and driving conditions significantly influences driver fatigue. Poorly maintained roads, congestion, and inadequate signage can lead to increased stress and physical exertion for truck drivers (Deshpande & Prabhakar, 2017). These factors not only impact the overall safety of the driver but also contribute to elevated levels of physical fatigue.

Environmental Stressors

Environmental factors, such as extreme weather conditions, play a crucial role in driver fatigue. Harsh weather, including excessive heat or monsoons, can lead to discomfort and increased physical exertion for truck drivers(Pandey et al., 2021). Studies have demonstrated a clear association between adverse weather conditions and heightened fatigue levels among drivers.

Ergonomics in the Cabin

The design and layout of the truck cabin also contribute to the physical well-being of drivers. Inadequate ergonomics, uncomfortable seating, and poor cabin ventilation can lead to musculoskeletal discomfort and contribute to the overall fatigue experienced by truck drivers (Pai & Sundar, 2018). Addressing these ergonomic issues is crucial for mitigating physical fatigue.

Sleep Quality and Rest Stops

The availability and quality of rest stops along transportation routes significantly impact driver fatigue. Insufficient and inadequate rest stops contribute to irregular sleep patterns and rest breaks, leading to increased physical fatigue (Binjabr et al., 2023). Ensuring proper infrastructure for rest and sleep is essential in promoting the well-being of truck drivers.

2. Objectives

To identify an association between work environment and Fatigue among truck drivers. Based of this objective, we develpeed the sub objectives.

- To Identify and categorize key aspects of the work environment related to truck drivers, such as:
    - driving hours,
    - workload,
    - schedule flexibility,
    - social support, and job satisfaction
    - Police harshment.

3. Methods

Study Design

The study followed an **observational cross-sectional analytical research design**. The study captured data from truck drivers on freight routes covering major National Highways linked through Jaipur, Rajasthan. The research followed a quantitative approach to data collection.

Study Area

The specific focus on truck drivers operating on freight routes covering major National Highways linked through Jaipur, Rajasthan, indicates the geographical scope of the study. The inclusion of this particular region suggests a deliberate choice, possibly influenced by the significance of these routes in the context of freight transportation or other relevant factors.

Sample size determination

The sample size was calculated to assess the truck driver's work environment and its influence on physical fatigue among truck drivers. For the purpose of this study, four halt points were identified randomly, and the sample size for each halt point was determined using Probability proportional to size (PPS) sampling method based on the average truck-traffic load in the last one week. The final sample of 300 truck drivers (with inclusion criteria as Truck driving is the main occupation; Drives a heavy truck with three or more axles; Has driven a heavy truck for 12 months or longer) was covered for the study. An inverse sampling procedure was used for selecting the sample from halt points.

Method of data collection

A structured questionnaire was used to collect information from the truck drivers. Data for this study was collected through face-to-face interviews with truck drivers on the mentioned freight routes and halt point. All the drivers who stop at roadside eateries, rest locations on National Highways/ outer regions of the city were approached to participate in the study.

Questionnaires

Different questionnaires were used to collect data from truck drivers on Fatigue and Work Environment.

- For Fatigue, Fatigue Severity Scale (Krupp et al., 1989), a unidimensional generic fatigue rating scale which emphasizes the functional impact of fatigue and contains items on physical and mental fatigue and social aspects. was used to collect data.
- Data regarding different variables on the work environment was collected using a questionnaire prepared after gaining critical insights from previous studies. The questionnaire recorded information about:
  - Driver demographics and driving characteristics,
  - Work environment *(Work routine and working hours, Workspace conditions, Family, and Social Engagement)*

Data Analysis and Scoring Methods

Data was analysed in SPSS 25. Descriptive statistics and multivariate logistic regression analysis has been done to identify the relationship between dependent and independent variables (Khanna et al., 2021).

Scoring and analysis of Fatigue

The Fatigue Severity Scale (FSS) serves as a method for evaluating the impact of fatigue on individuals. Comprising nine statements that gauge the severity of fatigue symptoms, interviewer read each statement and select/circle a number from 1 to 7. This rating based on how accurately the statement reflects respondents' condition in the current week and the extent to which they agree or disagree with its applicability. A total score below 36 indicates that the individual may not be experiencing significant fatigue. Conversely, a total score of 36 or higher suggests the possibility of requiring further evaluation by a physician.

Ethical Concerns

The protocols and data collection tools are used after ethical clearance from the Ethical Review Board. Informed consent was obtained from the respondents, which included their right not to answer all or some of the questions. Appropriate measures were used to ensure respondents' privacy and confidentiality of information.

4. Results & Discussion

Demographic profile of the respondents

The data on the age of the truck drivers revealed that around one-third of the respondents fall under the age group of 20-30 years, while one-fourth of the respondents are in the age group of 36-40 years. It is noted here that one-fifth of the respondents are from the age group of more than 40 years.

Table 1: Association between Age and fatigue

Age of the respondents	<35 years (n = 140)	>35 years (n = 160)	Total (n = 300)	$\chi 2$	p
Fatigue					
Suffering from fatigue	**30.1%**	**46.9%**	**39.0%**	**8.938**	**.003**

Fatigue calculated: <36 score: Not suffering from fatigue; >36 score: suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

To find out the association between age and fatigue among truck drivers, chi-square analysis was done. The chi-square analysis indicated a significant association between age and fatigue ($\chi 2 = 8.938$, $p = .003$). Individuals aged above 35 years were more likely to suffer from fatigue compared to those below 35 years (Table 1).

Table 2: Association between Marital status, fatigue

Marital Status of the TD	Separated/ never married (n=61)	Currently Married (n=239)	Total (n=300)	$\chi 2$	p
Fatigue					
Suffering from fatigue	31.1%	41.0%	39.0%	1.985	.186

Calculation: Score <36: Not suffering from fatigue; score >36: Suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

Similarly, association between marital status and fatigue was assessed using chi-square analysis. The results showed no significant association between the two variables (Table 2).

Working Hours and Fatigue

Table 3: Average truck driving time, and driving in one stretch among Truck Drivers (n=300)

Indicators	***%***
Average hours of driving truck in a day	
Average hours truck drivers drive trucks each day in daytime	5.5
Average hours truck drivers drive trucks each day in nighttime	6.0
Total	11.6
Average hours of driving truck in one stretch in a day	
Average hours truck drivers drive trucks each day in one stretch in daytime	3.9
Average hours truck drivers drive trucks each day in one stretch in nighttime	4.4
Average (Total)	4.1

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

The data (Table 3) reveals that the drivers drive throughout day and night, the combined driving time amounts to 12 hours per day. When differentiated between day and nighttime, it was seen that drivers, on average, spend almost equal time of around six hours behind the wheel each day in daytime, as well as in nighttime. It can be inferred here that driving is almost equally distributed in day and nighttime.

Additionally, the data explores into the continuous driving habits of truck drivers, showing that drivers spend an average of 4.1 hours driving trucks in one continuous stretch. These findings shed light on the varying workloads experienced by truck drivers based on their driving schedule, emphasizing the importance of considering both rest provisions and driving hour averages to optimize the working conditions and well-being of truck drivers.

Table 4: Association between working hours, fatigue

Working hours of truck driver	Less than 12 hours' drive (n=192)	12 Hours and more drive (n=108)	Total (n=300)	$\chi 2$	p
Fatigue					
Suffering from fatigue	32.3%	50.9%	39.0%	10.089	.001

Calculation: Score <36: Not suffering from fatigue; score >36: Suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

To assess the impact of working hours over fatigue, chi-square analysis was conducted. The chi-square analysis demonstrated significant association between working hours and fatigue ($\chi 2 = 10.089$, $p = .001$). Truck drivers working 12 hours, or more were more likely to experience fatigue compared to those working less than 12 hours. (Table 4)

Police Humiliation

Police checks/stops and instances of humiliation/abuse faced by truck drivers during their trips are commonly seen. According to the data, one-third of the truck drivers reported that on an average, they are stopped or checked by the police at least two times during each trip. More than one-third (37%) of drivers experienced it for three to five stops. However, a significant number of drivers, around 13.3 percent are stopped six to ten times during a single trip.

Regarding the conduct of police towards truck drivers, approximately 41 percent of drivers have experienced humiliation or abuse from law enforcement officials, even when they are following the rules. Out of these drivers, around 44 percent have faced such mistreatment multiple times, while more than one-third (36%) reported that it happens rarely, despite following the rules.

The study on trucking operations in India (2000), shared that police at outposts would stop the trucks at night hours and demand money for any unknown reason, as a consequence, truck drivers adjust the trip timings to avoid the duty hours of the police(AITD & CIRT, 2000) . They overspeed to pass the certain place before certain hours, which is definitely dangerous for the sake of road safety.

Demand for bribes, illegal issue of challans, delay in inter-state entry unless bribed and use of abusive languages and physical assaults were commonly reported concerns of the truck drivers(GRID Council, 2022).

According to one of the articles published, some of the drivers attempted to commit suicide due to police harassment. One of the drivers attempted to end his life and stated that "It was so humiliating that I decided to end my life then and there" (The Times of India, 2018).

Table 5: Association between police humiliation, fatigue

Humiliation/abuse from police even if comply rules	Not hamulated from police (n=178)	Humiliation/ abuse from police (n=122)	Total (n=300)	$\chi 2$	p
Fatigue					
Suffering from fatigue	37.6%	41.0%	39.0%	.340	.560

Calculation: Score <36: Not suffering from fatigue; score >36: Suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

The data indicates that truck drivers are frequently stopped by the police during their trips, with a significant number experiencing multiple stops. Other published article in public domain also mentioned that truck drivers are harassed even if they have all the necessary documents and follow the rules. Following media exposure, police officials were suspended(*Two Cops Suspended for Harassing Truck Drivers in Karnataka | Bengaluru News - Times of India*, n.d.) However, no significant association was found between police humiliation/abuse and fatigue ($\chi 2 = .340$, $p = .560$) (Table 5).

Workspace distraction and Fatigue

When data on comfort and distraction factors experienced by truck drivers in their truck cabins was analysed, the results showed that the majority of truck drivers (93%) feel comfortable with their truck driving seats. A significant proportion (83%) find the seating posture in the truck driving seat comfortable due to the size and design of the seat.

In terms of space, the data shows that majority of truck drivers (78%) feel there is adequate space for sleeping and driving in their truck cabin. This suggests that truck drivers may be able to comfortably sleep and drive in their truck cabins, but may experience some discomfort or cramped conditions, particularly during long drives.

The data also reveals that a significant proportion of truck drivers (16%) get distracted during driving due to truck noise and vibration. This could be a safety concern, as distractions while driving can increase the risk of accidents. Additionally, a significant proportion (34%) of truck drivers feel uncomfortable due to the heat of the truck cabin during driving. This could also impact their ability to focus and drive safely.

Overall, the data indicates that while truck drivers generally feel comfortable with their truck driving seats, they may experience discomfort or distraction due to factors such as seating posture, space, noise, vibration, and heat (Table 4.19).

Table 6: Association between workspace distraction and fatigue

Workspace distraction	No perceived workspace distraction (n=252)	Workspace distraction present (n=48)	Total (n=300)	$\chi 2$	p
Fatigue					
Suffering from fatigue	31.7%	77.1%	39.0%	34.837	.000

Calculation: Score <36: Not suffering from fatigue; score >36: Suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

The chi-square analysis revealed significant associations between workspace distraction and fatigue ($\chi2 = 34.837$, $p = .000$). Individuals experiencing workspace distraction were more likely to report higher levels of fatigue compared to those without workspace distraction (Table 6).

Table 7: Association between workspace condition and fatigue

Workspace condition	Comfortable (n=198)	Not Comfortable (n=102)	Total (n=300)	$\chi2$	p
Fatigue					
Suffering from fatigue	21.7%	72.5%	39.0%	73.118	.000

Calculation: Score <36: Not suffering from fatigue; score >36: Suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

The chi-square analysis revealed significant associations between uncomfortable workspace conditions and fatigue ($\chi2 = 73.118$, $p = .000$). Individuals working in uncomfortable workspace conditions were more likely to experience higher levels of fatigue compared to those in comfortable workspace conditions (Table 7).

Social Engagement

The data also discuss about the social engagement of the truck drivers, their frequency of visiting home, occasion to visit and participation in social events. According to the data, 77 percent of truck drivers participated in social events, indicating that a significant proportion of truck drivers engage in social activities. Regarding their ability to take leave for family or social events, 82 percent of truck drivers reported that they are rarely able to take leave. Around four percent of truck drivers reported that they never take leave for family or social events.

This indicates that while a significant number of truck drivers are able to participate in social events, there may be challenges in taking leave for family or social events, with a majority of drivers reporting that they are rarely able to do so. This could be due to various factors such as the demands of their job, lack of flexible scheduling, or other work-related constraints.

In a study conducted by GRID Council (2022), majority of the drivers reported to be unable to have a good family time due to their nature of work (GRID Council, 2022). Family engagements were compromised largely due to their driving profession. Due to the erratic nature of job, they felt helpless to support the families at the time of distress.

Table 8: Association between social engagement and fatigue

Participation in Social events	Yes (n=230)	No (n=70)	Total (n=300)	$\chi2$	p
Fatigue					
Suffering from fatigue	43.9%	22.9%	39.0%	10.001	.002

Calculation: Score <36: Not suffering from fatigue; score >36: Suffering from fatigue

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

The chi-square analysis revealed a significant association between social engagement and fatigue ($\chi2 = 10.001$, $p = .002$). Individuals who participated in social events were less likely to suffer from fatigue compared to those who did not (Table 8).

Multivariate Logistic Regression Analysis

To understand the degree of relationship between fatigue and predictor variables, multivariate logistic regression analysis was done.

Table 9: Multivariate Logistic Regression for Fatigue and predictor variables

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	.100	.253	.158	1	.691	1.106	.674	1.814
Marital Status	.387	.324	1.426	1	.232	1.473	.780	2.780
Working Hours	1.496	.341	19.242	1	.000	4.465	2.288	8.713
Police Humiliation	.262	.377	.483	1	.487	1.300	.621	2.721
Workspace distraction	1.806	.514	12.333	1	.000	6.088	2.222	16.684
Uncomfortable workspace conditions	1.308	.359	13.282	1	.000	3.698	1.830	7.472
No participation in Social Engagement	.526	.535	.968	1	.325	1.692	.593	4.826
Not satisfied with job	2.889	.444	42.271	1	.000	17.966	7.521	42.917
No support from supervisor	.467	.362	1.663	1	.197	1.595	.784	3.243

Source: The data was gathered by the researchers utilizing the statistical software SPSS 25 for analysis and output.

The results indicate that Working Hours (B = 1.496, Wald = 19.242, p = .000), Workspace Distraction (B = 1.806, Wald = 12.333, p < .001), Uncomfortable Workspace Conditions (B = 1.308, Wald = 13.282, p < .001), and Not Satisfied with Job (B = 2.889, Wald = 42.271, p < .001) were significantly associated with fatigue.

Specifically, for every one-unit increase in Working Hours, there was 4.465 times increase in the odds of experiencing fatigue. Similarly, a one-unit increase in Workspace Distraction was associated with 6.088 times increase in the odds of fatigue, while a one-unit increase in Uncomfortable Workspace Conditions was associated with a 3.698 times increase in the odds of fatigue. Furthermore, individuals not satisfied with their job were associated with 17.966 times higher odds of experiencing fatigue compared to those who were satisfied. Thus, it was found that working hours, workspace distractions, uncomfortable working conditions, and non-satisfaction with the job were significant predictors of fatigue (Table 9).

5. Conclusions and Recommendations

The demographic analysis reveals a varied age distribution among truck drivers, with a significant proportion falling within the younger age groups. However, age emerges as a significant factor associated with fatigue, with drivers above 35 years being more susceptible to fatigue compared to their younger counterparts.

Marital status, on the other hand, does not show a significant association with fatigue, indicating that factors other than marital status may influence fatigue levels among truck drivers. Working hours play a crucial role in determining fatigue levels, with drivers working longer hours experiencing higher levels of fatigue. The data underscores the need for regulating working hours to mitigate fatigue-related risks and ensure driver safety.

Instances of police humiliation and abuse during trips are prevalent among truck drivers, highlighting the need for improved law enforcement practices and support mechanisms for drivers facing such challenges.

Workspace distractions, discomfort, and inadequate conditions contribute significantly to driver fatigue. Addressing these environmental factors through ergonomic designs and interventions is essential for enhancing driver well-being and safety.

Social engagement emerges as a potential mitigating factor for fatigue, with drivers participating in social events being less likely to suffer from fatigue compared to those who do not engage in social activities.

Recommendations:

- Implement and enforce regulations to limit the maximum number of working hours for truck drivers, ensuring adequate rest periods to prevent fatigue.
- Provide training to law enforcement officials on respectful and fair treatment of truck drivers and establish mechanisms for drivers to report instances of harassment or abuse.
- Invest in ergonomic designs and improvements to truck cabin layouts to minimize distractions, discomfort, and environmental factors contributing to fatigue.
- Encourage trucking companies to facilitate opportunities for social engagement among drivers, such as organizing events and providing flexible scheduling for family and social activities. Address factors contributing to job dissatisfaction among truck drivers, such as inadequate support from supervisors or lack of opportunities for professional growth, to improve overall well-being and reduce fatigue.

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