World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(RESEARCH ARTICLE)

OCCUPATIONAL HEALTH HAZARDS, SLEEP DEPRIVATION, AND ROAD TRAFFIC ACCIDENTS AMONG LONG-DISTANCE TRUCK DRIVERS IN NIGERIA: A PUBLIC HEALTH ASSESSMENT

Adekunle Abayomi Dosunmu *

Department of Public Health, Faculty of Health Sciences, Imo State University, Owerri, Imo State, Nigeria.
* Corresponding Author

ORCID Details
Adekunle Abayomi Dosunmu: https://orcid.org/0009-0001-7857-6291

World Journal of Biology Pharmacy and Health Sciences, 2026, 28(02), 084–091

Publication history: Received on 25 September 2026; revised on 01 November 2026; accepted on 03 November 2026

Article DOI: https://doi.org/10.30574/wjbphs.2026.28.2.0537

Copyright © 2026 Author(s) retain the copyright of this article. This article is published under the terms of the Creative Commons Attribution License 4.0

ABSTRACT

Background: Road traffic accidents (RTAs) are a major cause of preventable mortality in low- and middle-income countries. In Nigeria, commercial heavy-goods haulage operators work under demanding occupational conditions characterized by prolonged shifts, poor ergonomic cab design, night transit, and chronic sleep restriction.

Objective: This study evaluates the prevalence of occupational health hazards, sleep deprivation patterns, vehicle telemetry infractions, and their combined effect on road traffic collisions among long-distance truck drivers operating along major freight corridors in Nigeria.

Methods: A cross-sectional epidemiological survey was conducted among 380 long-distance truck drivers recruited across five major freight depots and transport terminals connecting Lagos with northern and eastern transit routes. Data were collected using an interviewer-administered questionnaire assessing sociodemographics, work patterns, ergonomic strain, and daytime drowsiness via the Epworth Sleepiness Scale (ESS). Vehicle telemetry tracking reports documenting moving violations (speed exceedance, continuous driving duration, and night driving) were matched with self-reported 12-month crash and near-miss incidence. Multivariable logistic regression identified independent predictors of collision involvement.

Results: The mean age of respondents was 38.4 +/- 7.6 years, with an average weekly driving duration of 68.2 +/- 11.4 hours. A majority of drivers (64.2%) reported sleeping less than 6 hours per 24-hour cycle while on transit, and 47.9% met the criteria for excessive daytime sleepiness (ESS score >= 10). Chronic low back pain (71.3%) and physical exhaustion (66.8%) were the most common occupational complaints. Telemetry tracking confirmed that drivers who exceeded 8 hours of continuous driving and those scheduled for night transit (22:00 to 05:00) had higher violation counts. In multivariable logistic regression, excessive daytime sleepiness (AOR = 2.84, 95% CI: 1.68-4.81), sleeping under 6 hours daily (AOR = 2.19, 95% CI: 1.32-3.64), and routine night driving (AOR = 2.05, 95% CI: 1.24-3.39) were independent predictors of collision involvement.

Conclusion: Chronic sleep restriction, physical strain, and overnight scheduling are major determinants of freight vehicle crashes in Nigeria. Reducing these risks requires regulatory limits on continuous driving, dedicated roadside rest infrastructure, employer-based health programs, and the systematic use of telemetry data in workplace safety monitoring.

Keywords: Occupational health; Sleep deprivation; Commercial haulage; Long-distance truck drivers; Road traffic accidents; Nigeria; Telemetry tracking.

1 INTRODUCTION

Road traffic injuries are among the leading causes of preventable death and trauma worldwide, accounting for roughly 1.19 million deaths each year [1]. Low- and middle-income nations carry an estimated 93 percent of these fatalities despite possessing only 60 percent of the world's registered motor vehicles [1]. In Nigeria, road transportation accounts for more than 90 percent of domestic freight transit, including agricultural staples, refined petroleum, and manufactured goods [2]. Articulated trucks and heavy haulage vehicles therefore form the main artery of internal commerce. However, heavy commercial vehicles are also involved in a substantial share of severe and fatal crashes along Nigerian interstate corridors [2, 3].

Long-distance freight driving involves severe occupational strain [4]. Unlike intra-city commercial drivers, long-haul operators must manage multi-day trips over deteriorated roads, face ongoing personal security concerns, and meet tight delivery windows [4, 5]. Commercial drivers frequently fail to obtain the 7 to 8 hours of sleep per 24-hour cycle needed for cognitive recovery [6]. Circadian rhythm disruption occurs when drivers work through the early morning hours (02:00 to 06:00), a period when alertness and reaction speed drop naturally [6, 7].

The link between restricted sleep, involuntary microsleeps, and traffic accidents is well established [7, 8]. Drivers who lack sleep show reduced hazard awareness, slower braking reactions, and impaired lane control, often leading to moving violations [8, 9]. In Nigeria, these problems are made worse by a lack of secure roadside parking facilities on freight corridors, which leaves drivers to choose between parking on unlit highway shoulders or continuing to drive while fatigued [3, 5].

Modern commercial fleets increasingly use Global Positioning System (GPS) telemetry to track speed, vehicle location, engine hours, and trip progress [10]. Although fleet safety managers record data on night departures, overspeeding, and prolonged driving, these metrics are usually treated as disciplinary issues rather than objective indicators of physical fatigue and operational stress [10, 11]. Using these digital records alongside health surveys can help identify driving risks before crashes happen [10].

Few studies in Nigeria have evaluated how physical work hazards, sleep debt, and verified telemetry violations jointly contribute to collisions among heavy freight operators. Most regional research focuses on urban minibuses or commercial motorcyclists. This study evaluates the occupational health status, sleep patterns, telemetry records, and traffic accident history of long-distance truck drivers operating along primary freight routes in Nigeria.

2 MATERIAL AND METHODS

2.1 Study Setting and Design

This descriptive cross-sectional study was conducted between January and June 2026 across five commercial freight depots, logistics terminals, and loading yards in Lagos State. Lagos is the main seaport and industrial center of Nigeria, generating high volumes of interstate freight destined for the northern and eastern regions through the Lagos-Ibadan-Ilorin-Kano corridor and the Lagos-Benin-Onitsha corridor.

2.2 Study Population and Sampling

The target population consisted of male commercial long-distance truck drivers operating heavy-goods vehicles (HGVs) with cargo capacities of 20 metric tons or more. To be eligible, drivers had to be at least 18 years of age, have at least two years of commercial articulated truck experience, and be assigned to routes covering at least 300 kilometers per trip. Drivers assigned strictly to local warehouse shuttles or those with trucks undergoing major workshop repairs were excluded.

The sample size was determined using the Cochran formula for single proportions: $n = (Z^2 * p * (1 - p)) / d^2$, where $Z = 1.96$ (confidence level of 95%), $p = 0.38$ (estimated prevalence of crash involvement among long-haul drivers derived from regional literature [5]), and $d = 0.05$ (margin of error). The formula gave a baseline sample size of 363. To

account for missing records or non-response, the target was increased to 400. Multistage sampling was used to select logistics depots and recruit drivers during pre-trip dispatch checks and post-trip debriefings. A total of 380 questionnaires were fully completed and used in the analysis (95.0% completion rate).

2.3 Data Collection Instruments

Data were collected through an interviewer-administered questionnaire prepared in English and translated into Hausa, Yoruba, and Nigerian Pidgin. The tool was divided into four sections:

- Sociodemographic and Work Characteristics: Age, marital status, education level, commercial driving tenure, daily driving duration, weekly hours, and delivery schedule pressure.
- Occupational Health Complaints: Musculoskeletal symptoms (lower back pain, neck stiffness), visual strain, chronic dyspepsia, and self-reported physical exhaustion.
- Sleep Habits and Daytime Sleepiness: Daily sleep duration during transit, frequency of rest breaks, frequency of night driving (22:00 to 05:00), and daytime sleepiness measured using the Epworth Sleepiness Scale (ESS) [12]. The ESS contains eight daily scenarios scored from 0 (would never doze) to 3 (high chance of dozing), producing a total score between 0 and 24. A score of 10 or more was defined as excessive daytime sleepiness (EDS).
- Telemetry Violations and Accident History: Self-reported involvement in road traffic accidents (any collision causing vehicle damage, injury, or operational delay) and near-miss incidents over the previous 12 months. Self-reported records were matched against fleet telemetry logs covering continuous driving over 8 hours, speed limit violations (>80 km/h for heavy trucks), night transit, and GPS signal disconnections.

2.4 Data Analysis

Data were entered and analyzed using SPSS Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were calculated for sociodemographics, health symptoms, and sleep patterns. Categorical variables were compared using Pearson Chi-square (x^2) tests. Variables with an association at $p < 0.10$ in bivariate tests were entered into a multivariable binary logistic regression model to determine independent predictors of accident involvement. Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI) were calculated, with statistical significance set at $p < 0.05$.

2.5 Ethical Considerations

Ethical approval was granted by the Institutional Health Research Ethics Committee. Permission was also obtained from transport terminal managers and the transport union. Written or thumb-printed informed consent was obtained from each participant after explaining the study goals, voluntary participation, and confidentiality rules.

3 RESULTS

3.1 Sociodemographic and Occupational Profile

All 380 participants were male. The mean age was 38.4 +/- 7.6 years, with 47.4% falling between 31 and 40 years. Most respondents were married (76.8%). A total of 43.7% had completed primary school, 41.3% had completed secondary school, and 15.0% had no formal schooling. The mean driving tenure was 11.2 +/- 5.8 years. Over half of the cohort (57.9%) drove more than 10 hours per day, and the mean weekly work duration was 68.2 +/- 11.4 hours.

Table 1: Sociodemographic and Occupational Characteristics of Long-Distance Truck Drivers (N = 380)

Variable	Frequency (n)	Percentage (%)
Age Category: 20 - 30 years	68	17.9%
Age Category: 31 - 40 years	180	47.4%
Age Category: 41 - 50 years	102	26.8%
Age Category: > 50 years	30	7.9%
Educational Level: No Formal Education	57	15.0%
Educational Level: Primary School Completed	166	43.7%
Educational Level: Secondary School Completed	157	41.3%
Marital Status: Single	73	19.2%

Marital Status: Married	292	76.8%
Marital Status: Divorced / Widowed	15	3.9%
Commercial Driving Experience: < 5 years	54	14.2%
Commercial Driving Experience: 5 - 10 years	158	41.6%
Commercial Driving Experience: > 10 years	168	44.2%
Average Daily Driving Hours: <= 8 hours	62	16.3%
Average Daily Driving Hours: 9 - 10 hours	98	25.8%
Average Daily Driving Hours: > 10 hours	220	57.9%
Weekly Work Hours: <= 50 hours	45	11.8%
Weekly Work Hours: 51 - 70 hours	198	52.1%
Weekly Work Hours: > 70 hours	137	36.1%
Turnaround Deadline Pressure: Mild / Moderate	114	30.0%
Turnaround Deadline Pressure: Severe / Highly Pressured	266	70.0%

3.2 Occupational Health Hazards and Morbidity

Prolonged sitting, whole-body vibration, and irregular meals contributed to high rates of physical symptoms. Chronic low back pain was the most common complaint (71.3%), followed by generalized exhaustion (66.8%), eye strain (52.4%), and neck or shoulder stiffness (48.2%). Gastric irritation was reported by 37.1% of drivers.

Table 2: Self-Reported Occupational Health Complaints Among Drivers (*Categories not mutually exclusive)

Reported Condition	Frequency (n)	Percentage (%)
Musculoskeletal: Chronic Low Back Pain	271	71.3%
Musculoskeletal: Neck / Shoulder Stiffness	183	48.2%
Musculoskeletal: Knee / Joint Pain	139	36.6%
General Health: Physical Exhaustion	254	66.8%
Sensory: Visual Strain / Eye Fatigue	199	52.4%
Gastrointestinal: Gastric Irritation / Dyspepsia	141	37.1%
Neurological: Recurrent Headaches	128	33.7%
Vascular: Hemorrhoids	92	24.2%
Psychological: Workplace Anxiety / Stress	164	43.2%

3.3 Sleep Patterns, Daytime Sleepiness, and Telemetry Records

Drivers had short, interrupted sleep schedules. Only 18.4% achieved 7 or more hours of sleep daily while on the road; 64.2% slept between 4 and 6 hours, and 17.4% obtained less than 4 hours. The average daily sleep duration was 5.1 +/- 1.3 hours. Based on the Epworth Sleepiness Scale, 182 drivers (47.9%) scored 10 or higher, indicating excessive daytime sleepiness. Telemetry records showed that 55.3% drove during the night window (22:00 to 05:00) three or more times a week. Furthermore, 41.6% had recorded violations for driving over 8 consecutive hours without a 30-minute rest stop, and 38.9% had registered speed violations (>80 km/h).

Table 3: Sleep Indices, Daytime Sleepiness, and Telemetry Violations (N = 380)

Variable	Frequency (n)	Percentage (%)
Average Sleep Duration (24h): < 4 hours (Severe restriction)	66	17.4%
Average Sleep Duration (24h): 4 - 6 hours (Moderate)	244	64.2%
Average Sleep Duration (24h): >= 7 hours (Adequate)	70	18.4%
Epworth Sleepiness Scale: Normal (Score 0 - 9)	198	52.1%
Epworth Sleepiness Scale: Excessive Sleepiness (>= 10)	182	47.9%
Night Driving (22:00-05:00): Rarely / Never	68	17.9%
Night Driving (22:00-05:00): Occasional (1 - 2 nights/week)	102	26.8%
Night Driving (22:00-05:00): Frequent (>= 3 nights/week)	210	55.3%
Telemetry Violations: Driving > 8 Hours Non-stop	158	41.6%
Telemetry Violations: Speed Limit Violation (> 80 km/h)	148	38.9%
Telemetry Violations: Route Deviation	65	17.1%
Telemetry Violations: GPS Disconnection	52	13.7%
12-Month Crash History: Involved in >= 1 Accident	122	32.1%
12-Month Crash History: Reported >= 1 Near-Miss Incident	218	57.4%

3.4 Predictors of Road Traffic Accidents

Over the previous 12 months, 122 drivers (32.1%) had been involved in at least one collision causing vehicle damage or injury, and 57.4% reported at least one near-miss incident related to drowsiness or delayed braking. In multivariable logistic regression adjusted for age and driving experience, excessive daytime sleepiness was strongly associated with crash involvement (AOR = 2.84, 95% CI: 1.68-4.81, $p < 0.001$). Sleeping under 6 hours daily increased crash odds more than twofold (AOR = 2.19, 95% CI: 1.32-3.64, $p = 0.002$). Regular night transit (AOR = 2.05, 95% CI: 1.24-3.39, $p = 0.005$), driving continuously for over 8 hours (AOR = 1.88, 95% CI: 1.15-3.08, $p = 0.012$), and severe delivery pressure (AOR = 1.94, 95% CI: 1.10-3.41, $p = 0.021$) were also significant independent risk factors.

Table 4: Multivariable Logistic Regression Analysis of Factors Associated with Road Traffic Accidents (*p < 0.05)

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Sleep Duration (24h): >= 7 hours	1.00 (Reference)	-	-
Sleep Duration (24h): < 6 hours	2.19	1.32 - 3.64	0.002*
Epworth Sleepiness Scale: Normal (Score 0 - 9)	1.00 (Reference)	-	-
Epworth Sleepiness Scale: Excessive Sleepiness (>= 10)	2.84	1.68 - 4.81	< 0.001*
Night Driving Frequency: Rarely / Occasional	1.00 (Reference)	-	-
Night Driving Frequency: Frequent (>= 3 nights/week)	2.05	1.24 - 3.39	0.005*
Continuous Shift Length: <= 8 hours	1.00 (Reference)	-	-
Continuous Shift Length: > 8 hours (Telemetry verified)	1.88	1.15 - 3.08	0.012*
Turnaround Deadline Pressure: Mild / Moderate	1.00 (Reference)	-	-
Turnaround Deadline Pressure: Severe / Urgent	1.94	1.10 - 3.41	0.021*
Years of Driving Experience: > 10 years	1.00 (Reference)	-	-

Years of Driving Experience: <= 5 years	1.52	0.88 - 2.62	0.134
Age Category: > 40 years	1.00 (Reference)	-	-
Age Category: <= 30 years	1.41	0.79 - 2.51	0.245

4 DISCUSSION

The results show that long-distance freight drivers in Nigeria work under heavy physical strain and severe sleep restriction. Most drivers in this study were between 30 and 50 years of age and carried heavy family financial responsibilities, which often pushes operators to work longer hours and skip rest breaks [4, 5]. More than 80 percent drove beyond 8 hours a day, and over half worked more than 70 hours a week.

Musculoskeletal complaints, especially chronic lower back pain (71.3%), were widespread. Long driving hours expose drivers to whole-body vibration, poor seat ergonomics, and prolonged sitting, all of which strain the spine [13, 14]. These findings match earlier studies showing that professional commercial drivers have high rates of occupational back injuries [13, 14]. Chronic spinal discomfort leads to poor sleep and increases fatigue during subsequent trips [14, 15].

Restricted sleep was common: 64.2% of drivers obtained under 6 hours of sleep a day during transit trips, and 47.9% showed excessive daytime sleepiness. These rates are higher than those seen in commercial fleets operating under mandatory electronic logging device rules in North America and Europe [16]. In Nigeria, several factors limit sleep: poor or absent roadside parking areas, fear of highway crime at night, and tight delivery schedules [3, 17]. To stay awake, drivers often open windows, chew kola nuts, or take unregulated stimulants, which offer only temporary alertness and do not replace restorative sleep [18].

Fleet telemetry logs confirmed these work patterns: 41.6% of drivers had recorded continuous driving shifts exceeding 8 hours without rest, and over half regularly drove at night. Operating vehicles between midnight and early morning coincides with the human circadian low, when reaction times slow and microsleep episodes become more frequent [7, 19]. Both continuous driving for more than 8 hours (AOR = 1.88) and frequent night transit (AOR = 2.05) were independent predictors of collisions.

Multivariable regression showed that excessive daytime sleepiness was the strongest predictor of accident involvement (AOR = 2.84). This matches findings by Bekibele et al. [3] and Maycock [8], who reported that fatigue-related lapses in attention frequently precede rear-end collisions and roadway departures. Tight delivery deadlines also increased collision risk (AOR = 1.94). When fleet operators set unrealistic delivery timelines that fail to consider traffic jams, security checkpoints, and poor road conditions, drivers are pushed to speed and skip rest stops [10, 20].

Commercial truck crashes produce large societal costs. Given the weight of these vehicles, collisions often lead to multiple deaths, property destruction, and road blockages along key trade routes [1, 2]. Addressing this issue requires coordinated safety interventions that combine regulatory enforcement, logistical improvements, and driver health programs [21, 22].

5 CONCLUSION

Long-distance heavy truck drivers in Nigeria experience high rates of physical symptoms, chronic sleep restriction, and organizational pressure. Over 47 percent of drivers had excessive daytime sleepiness, and nearly two-thirds slept fewer than 6 hours per day while working. Statistical modeling confirmed that excessive daytime drowsiness, short sleep duration, night driving, continuous shifts beyond 8 hours, and tight turnaround deadlines were independent predictors of traffic accidents. Improving freight transport safety will require joint action by regulators, fleet operators, and public health agencies to manage driver fatigue effectively.

Recommendations

- **Enforce Limits on Continuous Driving:** Transport authorities should implement and enforce limits on continuous driving for commercial freight operators, requiring an uninterrupted 30-minute rest break every 4 hours and capping daily driving time at 8 hours.
- **Build Secure Roadside Rest Areas:** Highway authorities and private partners should construct secure, well-lit rest stops along major interstate routes to give drivers safe places to park, rest, and sleep.
- **Use Telemetry Data for Safety Monitoring:** Transport companies should use existing GPS tracking systems to monitor driver fatigue indicators, such as continuous shift length and night operations, rather than using data only for cargo tracking.

- **Provide Driver Health Screenings:** Haulage firms and driver unions should offer regular health checks for sleep disorders, high blood pressure, and visual problems, combined with training on sleep habits and fatigue management.
- **Adjust Dispatch Schedules:** Logistics managers should plan transit timelines that account for road conditions, border checks, and mandatory rest periods to prevent drivers from having to skip sleep to meet delivery targets.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

The author extends sincere appreciation to the transport terminal managers, safety officers, and commercial truck drivers across the freight logistics hubs for their collaboration, workspace provision, and support during field data collection.

Disclosure of conflict of interest

The author declares that there are no financial, personal, or professional conflicts of interest associated with this research.

Statement of ethical approval

Ethical approval was granted by the Institutional Health Research Ethics Committee of Imo State University, Owerri, Imo State, Nigeria.

Statement of informed consent

Informed written or thumb-printed consent was obtained from all individual participants included in this study prior to questionnaire administration and telemetry cross-matching.

REFERENCES

[1] World Health Organization. Global status report on road safety 2023. Geneva: World Health Organization; 2023. ISBN: 978-92-4-008651-7.

[2] Federal Road Safety Corps. Annual statistical report on commercial vehicle road traffic crashes in Nigeria. Abuja: Federal Road Safety Corps; 2022. Available from: https://frsc.gov.ng/

[3] Bekibele CO, Fawole OI, Bamgboye AE, Adejumo AA, Ajayi R, Baiyeroju AM. Risk factors for road traffic accidents among drivers of public institutions in Ibadan, Nigeria. African Journal of Health Sciences. 2008;14(3):137-142. DOI: 10.4314/ajhs.v14i3.30860

[4] Adekoya NO, Owoaje ET. Occupational hazards and safety practices among long-distance commercial drivers in a suburban community in Southwest Nigeria. Journal of Community Medicine and Primary Health Care. 2018;30(2):45-56.

[5] Aworemi JR, Abdul-Azeez IA, Oyedokun AJ. An evaluation of the causes of road traffic accidents in Nigeria: a study of selected transport operators. International Journal of Business and Social Science. 2010;1(2):199-204.

[6] Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, DonCarlos L, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health. 2015;1(1):40-43. DOI: 10.1016/j.sleh.2014.12.010

[7] Schiza SE, Bouloukaki I. Screening for obstructive sleep apnoea in professional drivers. Breathe. 2020;16(2):190165. DOI: 10.1183/20734735.0364-2019

[8] Maycock G. Sleepiness and driving: the experience of heavy goods vehicle drivers in the UK. Journal of Sleep Research. 1997;6(4):238-244. DOI: 10.1111/j.1365-2869.1997.00238.x

[9] Philip P, Chaufton C, Orriols L, Lagarde E, Amoros E, Laumon B, et al. Complaints of poor sleep and risk of traffic accidents: a population-based case-control study. PLoS ONE. 2014;9(12):e114102. DOI: 10.1371/journal.pone.0114102

[10] Bakhit PR, Guo F. Driver behavior indices from large-scale fleet telematics data as surrogate safety measures. Accident Analysis & Prevention. 2023;181:106879. DOI: 10.1016/j.aap.2022.106879

[11] Williamson A, Lombardi DA, Folkard S, Stutts J, Courtney TK, Connor JL. The link between fatigue and safety. Accident Analysis & Prevention. 2011;43(2):498-515. DOI: 10.1016/j.aap.2009.11.011

[12] Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. Sleep. 1991;14(6):540-545. DOI: 10.1093/sleep/14.6.540

[13] Robb MJM, Mansfield NJ. Self-reported musculoskeletal problems amongst professional truck drivers. Ergonomics. 2007;50(6):814-827. DOI: 10.1080/00140130701220341

[14] Baig SA, Raza A, Ali A. Prevalence of low back pain in professional drivers: a meta-analysis. Public Health.

[15] Apostolopoulos Y, Sönmez S, Shattell MM, Belzer M. Worksite-induced morbidities among truck drivers in the United States. AAOHN Journal. 2010;58(7):285-296. DOI: 10.1177/216507991005800703

[16] Federal Motor Carrier Safety Administration (FMCSA). Hours of service of drivers: final rule. Federal Register. 2020;85(106):33395-33483.

[17] Sumaila AF. Developing a national transport logistics policy for Nigeria. Journal of Transport Literature. 2013;7(2):290-309. DOI: 10.1590/S2238-10312013000200015

[18] Lasebikan V. Is cannabis use related to road crashes? A study of long distance commercial drivers in Nigeria. African Journal of Drug and Alcohol Studies. 2010;9(1):1-10. DOI: 10.4314/ajdas.v9i1.61755

[19] Åkerstedt T. Consensus statement: fatigue and accidents in transport operations. Journal of Sleep Research. 2000;9(4):395. DOI: 10.1046/j.1365-2869.2000.00228.x

[20] Morrow PC, Crum MR. Antecedents of fatigue, close calls, and crashes among commercial motor-vehicle drivers. Journal of Safety Research. 2004;35(1):59-69. DOI: 10.1016/j.jsr.2003.07.004

[21] Gander P, Hartley L, Powell D, Cabon P, Hitchcock E, Tuomilehto H, et al. Fatigue risk management: organizational factors at the regulatory and industry/company level. Accident Analysis & Prevention. 2011;43(2):573-590. DOI: 10.1016/j.aap.2009.11.007

[22] Racioppi F, Eriksson L, Tingvall C, Villaveces A. Preventing road traffic injury: a public health perspective for Europe. Copenhagen: WHO Regional Office for Europe; 2004.