TPM Vol. 32, No. S1, 2025
ISSN: 1972-6325
https://www.tpmap.org/

A CROSS - SECTIONAL ANALYTICAL STUDY ON SLEEP QUALITY AMONG OCCUPATIONAL BUS DRIVERS IN CHENNAI, TAMIL NADU

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ABSTRACT

Introduction: Sleep disturbances directly affects psychomotor skills, memory, concentration, decision making, all these are directly or indirectly results in accidents. This study intends to assess the sleep quality among bus drivers associated factors affecting their sleep quality.

Methodology: A cross-sectional study was conducted between June 2021 – August 2021 among the bus drivers working in a government bus depot under Tamil Nadu state transport corporation. Out of 220, 196 bus drivers were interviewed after obtaining informed consent. Data was collected using a pretested semi-structured questionnaire. Data was entered in MS Excel and analysed by using SPSS version 25. Descriptive statistics and Chi-square test were calculated.

Results: The mean age of the study participants was 44.6 (+ 7 SD) years. Among the study participants 87.8% belong to upper middle class based on Modified BG Prasad socioeconomic scale (2021). Out of 196, (30.6%) of them reported with history of chronic illness. Regarding lifestyle behaviours, 39.3% have history of substance use. Mean work experience among the bus drivers was 11.4 (+ 4.7 SD) years. Most of the study participants had less than 6 hours of (49.5%). Results from final PQSI score indicated that 70.4% of our study participants had poor sleep quality (PQSI > 5). Increased age and maximum duration of service found to be significantly associated with poor sleep quality of the bus drivers (p value < 0.05).

Conclusion: Sleep quality among the bus drivers can be improved by modifying their occupational characteristics like regulated duty schedule, drivers accompanied by alternative drivers in case of long duration journey and sufficient resting hours

Keywords: Sleep quality, tobacco usage, stress, bus drivers, duration of work.

INTRODUCTION

Background

One of the most common health concerns experienced by many people is the alteration of sleep patterns, which have direct or indirect connections with age, gender, social, economic, and occupational factors. Such conditions are commonly observed among the most vulnerable post-industrial populations, such as bus drivers. Stress faced by occupational bus drivers significantly impacts their health, leading to altered sleeping and eating habits, lifestyle changes, and behavioral patterns, which in turn cause physical, mental, and behavioral changes (1). These changes reduce the efficiency of individuals while operating buses, posing risks to public safety.

In recent years, multiple studies have demonstrated a strong link between lack of sleep, fatigue, and psychosocial or behavioral disorders, contributing to traffic accidents and unsafe conditions for passengers and pedestrians (2). Poor sleep quality has various impacts on physical and mental health, including daytime sleepiness, irritability, lack of concentration, impatience, anxiety, and stress (3,4). Additionally, factors like substance use, excessive caffeine intake, and unhealthy dietary habits can negatively affect sleep hygiene (4).

Sleep deprivation in bus drivers is particularly concerning because it not only endangers their health but also jeopardizes the lives of others. Working conditions such as long hours, shift-based schedules, and driving at night exacerbate sleep disturbances, impairing drivers' concentration and decision-making capacity, and increasing their reaction times (3). Sleep disorders, circadian rhythm disturbances, and reduced sleep duration are frequently reported among bus drivers (5,6). Moreover, insufficient sleep is often associated with medical conditions such as depression, narcolepsy, and the use of medications affecting the central nervous system (7).

Rationale

Sleep quality is a critical determinant of overall health, well-being, and professional performance, particularly among occupational drivers responsible for public safety. In India, urban areas like Chennai present additional challenges for bus drivers due to high traffic density, long working shifts, noise exposure, and psychosocial stress, which further compound sleep disturbances (8). Insufficient sleep has been linked to chronic conditions, including hypertension, obesity, diabetes, and cardiovascular diseases, amplifying the health risks for professional drivers (9). Despite the global evidence highlighting the significance of sleep quality in occupational groups, limited data is available on bus drivers in Chennai, Tamil Nadu. Understanding the prevalence and factors influencing sleep quality in this population is crucial to developing targeted interventions that improve health outcomes and road safety (10).

Objective

The purpose of this study is to assess the quality of sleep among bus drivers and to investigate the relationship between **Pittsburgh Sleep Quality Index (PSQI)** scores and their demographic, lifestyle, and occupational characteristics.

METHODOLOGY:

Study Design

A population-based cross-sectional study was conducted to evaluate the sleep quality of occupational bus drivers employed at the Government Bus Depot in Iyyapanthangal, Chennai, under the Tamil Nadu State Transport Corporation (TNSTC). The study was carried out over three months, from June 2021 to August 2021.

Study Population

The study targeted all bus drivers working in both morning and night shifts at the Iyyapanthangal bus depot. Participation was voluntary, and informed consent was obtained from all participants. Drivers who were chronic absentees, unwilling to participate, or unavailable even after three consecutive visits were excluded from the study to ensure the reliability of the findings.

Sampling Method

A universal sampling method was employed, including all eligible bus drivers who met the inclusion criteria. Out of the 220 drivers working at the depot, 196 participants were successfully enrolled in the study after applying the exclusion criteria.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee prior to the initiation of the study. Participants were briefed about the study's purpose, procedures, and potential benefits. Written informed consent was secured from each participant, ensuring voluntary participation and adherence to ethical research standards. Confidentiality was maintained throughout the study, and the data were used solely for research purposes.

Data Collection Tools

A pretested, semi-structured questionnaire was designed to capture comprehensive data from the participants. It included the following components:

1. Socio-demographic details: Age, gender, marital status, educational level, and income.
2. Lifestyle behaviors: Smoking, alcohol consumption, physical activity, and dietary habits.
3. Occupational characteristics: Duration of employment, work shifts, workload, and exposure to occupational stress.
4. Sleep quality assessment: Assessed using the Pittsburgh Sleep Quality Index (PSQI), a validated tool widely used in sleep research.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI evaluates sleep quality over the previous month using seven components:

1. Subjective sleep quality
2. Sleep latency
3. Sleep duration
4. Habitual sleep efficiency
5. Sleep disturbances
6. Use of sleeping medications
7. Daytime dysfunction

Each component is scored on a scale from 0 to 3. The total PSQI score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A cut-off score of ≥5 was used to classify participants as having poor sleep quality.

Data Collection Procedure

Field investigators conducted interviews with participants during their work hours, scheduling sessions during non-peak hours to accommodate shift patterns. Morning interviews were conducted between 7:00 AM and 9:00 AM, and evening interviews were conducted between 4:00 PM and 6:00 PM.

The interviews were conducted in private settings within the depot to ensure confidentiality and promote honest responses. Field investigators adhered to a standardized protocol to minimize interviewer bias and ensure consistency across all interviews. Responses were recorded immediately to maintain data accuracy.

Data Management

Statistical Analysis

The collected data were systematically entered into Microsoft Excel, ensuring data integrity and accuracy through thorough cross-verification. The cleaned dataset was then imported into SPSS version 25 for statistical analysis.

Descriptive Statistics

Descriptive statistics were computed to summarize the study population's socio-demographic characteristics, lifestyle behaviors, and occupational details. These results were expressed as frequencies and percentages for categorical variables and as means and standard deviations for continuous variables.

Inferential Statistics

To examine associations between various factors and sleep quality, the following statistical methods were employed:

1. Test of proportions: Used to evaluate differences in proportions of categorical variables across subgroups.
2. Chi-square test: Applied as a test of significance to assess the relationship between the PSQI scores and various socio-demographic, lifestyle, and occupational factors.
3. Logistic regression analysis (if applicable): Multivariate analysis was considered to identify independent predictors of poor sleep quality, adjusting for potential confounders.

Statistical Significance

A p-value of <0.05 was considered statistically significant, indicating that the observed associations were unlikely to have occurred by chance. All results were interpreted with respect to their clinical and practical relevance to the occupational health of bus drivers.

Quality Assurance Measures

To ensure the reliability and validity of the data, the following quality assurance measures were implemented:

1. Pilot Testing: The semi-structured questionnaire was pretested on a small sample of bus drivers to identify potential issues with clarity and relevance.
2. Training of Field Investigators: Investigators received comprehensive training on conducting interviews, recording responses, and handling sensitive information.
3. Double Data Entry: Data entry was independently performed by two researchers to detect and resolve discrepancies.

Supervision: The data collection process was supervised by the principal investigator to ensure adherence to protocols.

RESULTS

All the bus drivers (196) were male with the mean age of 44.6 (+ 7 SD) years. Among the study participants 56.6% completed higher secondary followed by 41.8% finished primary education. Majority of the study participants belong to upper middle class (87.8%) based on Modified BG Prasad socio-economic scale [2021]. Most of the bus drivers are married (96.9%) and have a mixed diet pattern (91.8%). Out of 196, 60 of the bus drivers (30.6%) reported with chronic illness, among them systemic hypertension was more prevalent (18.4%) followed by Diabetes mellitus (10.2%). Regarding lifestyle behaviors, 39.3% have history of substance use, in which 14.8% currently using both tobacco and alcohol. Mean work experience among the bus drivers was 11.4 (+ 4.7 SD) years. About 49.5% had less than 6 hours of sleep with an average sleep duration of 5.4 (+ 1.6 SD) hours. Mean time taken by the study participants to fall asleep was 30.8 (+ 17 SD) minutes. Sleep latency between 16 and 30 minutes was reported by 44.4% of the bus drivers, habitual sleep efficiency of less than 65% was seen in 44.4% of the participants. Majority of participants (98.5%) has no habit of using sleeping pills. Results from final PQSI score indicated that 70.4% of our study participants had poor sleep quality (PQSI > 5). Table 1 represents components of PSQI score.

Table 1: Components of PSQI score among the bus drivers (N = 196)

PSQI Components	N	%
1. Subjective sleep quality:		
• Very good	129	65.8
• Fairly good	61	31.1
• Fairly bad	4	2
• Very bad	2	1
2. Sleep Latency (mins):		
• ≤ 15	61	31.1
• 16-30	87	44.4
• 31-60	47	24
• ≥ 60	1	0.5
3. Sleep Duration (in hours):		
• ≥ 7	28	14.3
• 6-7	71	36.2
• 5-6	40	20.4
• ≤ 5	57	29.1
4. Sleep Efficiency (%):		
• ≥ 85	108	55.1
• 15-84	1	0.5
• 65-74	0	0
• ≤ 65	87	44.4
5. Usage of sleep Medication		
• Never	193	98.5
• Less than once a week	1	0.5
• More than once a week	2	1
6. Global PSQI Score:		
• Poor sleepers (PSQI >5)	138	70.4
• Good sleepers (PSQI ≤5)	58	29.6

Table 2 represents, the association between socio demographic details and sleep quality among the bus drivers, included age, educational qualification, per capita income based on Modified BG Prasad classification [2021], marital status, chronic illness, smoking and alcohol use. Increase in age have significant association with poor sleep quality among the study participants. Increase in age shows significant association with poor sleep quality of the bus drivers ($p < 0.05$).

Table 2: Association between socio-demographic details and sleep quality among the bus drivers (N = 196):

Socio-demographic details	Global PSQI		Chi-square (p Value)
	Good Sleep (N%)	Poor Sleep (N%)	
1. Age (years):			
• ≤ 44	20 (21.1%)	75 (78.9%)	5.762
• >44	37 (36.6%)	64 (63.4%)	**(0.016) ***
2. Education:			
• Primary	24 (29.3%)	58 (70.7%)	0.002
• Secondary	33 (28.9%)	81 (71.1%)	(0.961)
3. Per capita Income:			
• Upper middle	49(28.5%)	123 (71.1%)	0.240
• Middle & Lower Middle	8 (33.3%)	16 (66.7%)	(0.624)
4. Marital status:			
• Married	55(28.9%)	135(71.1%)	0.562
• Unmarried	2 (33.3%)	4 (66.7%)	
5. Alcohol & Tobacco:			
• Present	27 (35.1%)	50 (64.9%)	2.201
• Absent	30 (25.2%)	89 (74.8%)	(0.138)
6. Chronic Illness:			
• Present	51 (28.3%)	129 (71.7%)	0.599
• Absent	6 (37.5%)	10 (62.5%)	(0.439)

DISCUSSION:

This study aimed to assess sleep quality and its associated factors among bus drivers working at the Iyyapanthangal depot in Chennai, Tamil Nadu. The findings revealed that **70.4% of the participants had poor sleep quality (PSQI > 5)**, highlighting a significant burden of sleep disturbances in this occupational group. These findings align with a study conducted in Thailand, where poor sleep quality was observed in **68.9% of long-distance bus drivers**, raising critical safety concerns for both drivers and the public (11).

The **mean age of the study participants was 44.6 years**, with increasing age showing a significant association with poor sleep quality ($p < 0.05$). This is consistent with research indicating that sleep quality declines with age due to physiological changes and cumulative occupational stress (12). However, studies in Western countries have not consistently found this association, suggesting potential regional and cultural variations in sleep quality patterns (13).

Despite the prevalence of **chronic illnesses such as hypertension (18.4%) and diabetes (10.2%)**, this study did not find a significant association between chronic illnesses and sleep quality, a finding contrary to studies in Iran and Malaysia, where such conditions were linked to poorer sleep quality (14,15). These discrepancies could stem from differences in healthcare access, chronic illness management, or health awareness among drivers in various regions.

The **average sleep duration was 5.4 hours**, with nearly half (49.5%) reporting less than six hours of sleep daily. This is below the recommended **7–8 hours of sleep for adults** and highlights occupational challenges such as shift work and long working hours. A similar trend was reported among urban bus drivers in Tehran, where drivers averaged less than six hours of sleep per night (16). Reduced sleep duration and poor sleep efficiency (habitual efficiency <65% in 44.4% of participants) further compound fatigue, impair decision-making, and reduce driving performance, posing risks to public safety.

Lifestyle factors such as **substance use** were examined, with **39.3% of participants reporting a history of substance use**, yet no significant association was found between substance use and sleep quality. This contrasts with findings from Malaysia and Thailand, where alcohol and tobacco use were associated with impaired sleep

(11,15). These differences may reflect underreporting of substance use due to social desirability bias or regional variations in substance consumption patterns.

The study also highlighted increased **sleep latency** and decreased sleep duration among participants, which are known to reduce alertness and cognitive performance (16). Despite these disruptions, the prevalence of sleeping pill usage was low (**1.5%**), contrasting with **7.4%** reported in an Iranian study (17). This low usage may reflect cultural or occupational differences in addressing sleep issues.

This study reinforces the significant impact of long working hours, tight schedules, and shift-based employment on the sleep quality of bus drivers. The findings underscore the need for targeted interventions to improve sleep quality, such as promoting awareness about sleep hygiene, optimizing work schedules, and incorporating regular health screenings. Addressing these issues is critical not only for the drivers' health and well-being but also for reducing the risk of road accidents and enhancing public safety (18).

Efforts to improve sleep quality must also consider the broader occupational challenges faced by bus drivers, including reducing shift lengths and providing adequate rest periods. Future research should incorporate objective sleep measures, such as actigraphy or polysomnography, to provide a more comprehensive understanding of the dynamics influencing sleep quality in this population.

LIMITATION: This study, while providing significant insights into the sleep quality of bus drivers, has several limitations that must be acknowledged.

Firstly, the cross-sectional design limits the ability to establish causal relationships between sleep quality and the associated factors. While associations were identified, the temporal sequence between poor sleep quality and contributing factors could not be determined, as noted in similar studies (19).

Secondly, self-reported data were used to assess sleep quality and other variables, which may be subject to recall bias or social desirability bias. Participants might have underreported lifestyle behaviors such as substance use or overestimated their sleep duration, as previously highlighted in similar studies evaluating occupational drivers (14).

Additionally, the study was confined to bus drivers working at a single government bus depot in Chennai, which may limit the generalizability of the findings to drivers in other regions or private transport sectors. Regional differences in working conditions, traffic patterns, and occupational stressors could lead to varying sleep quality outcomes, as reported in studies conducted in different countries (11,20).

The study also did not assess certain psychological and environmental factors, such as anxiety, depression, or noise pollution, which are known to affect sleep quality (13). These factors might have provided a more comprehensive understanding of the drivers' sleep patterns.

Lastly, the reliance on the **Pittsburgh Sleep Quality Index (PSQI)**, while a robust tool, does not incorporate objective measures such as actigraphy or polysomnography, which could provide more accurate data on sleep quality and disturbances. Similar concerns have been raised in prior studies that relied solely on subjective sleep assessments (17).

Despite these limitations, the study provides valuable data on the prevalence and factors influencing sleep quality among bus drivers, emphasizing the need for targeted interventions to address occupational health and safety concerns.

CONCLUSION:

This study highlights the high prevalence of poor sleep quality among occupational bus drivers working under the Tamil Nadu State Transport Corporation in Chennai, with 70.4% of participants scoring poorly on the **Pittsburgh Sleep Quality Index (PSQI)**. Factors such as age and sleep efficiency emerged as significant contributors to poor sleep quality, consistent with global findings that occupational stress, long working hours, and shift patterns negatively impact sleep (11,12).

The findings align with previous studies that reported an association between inadequate sleep duration, fatigue, and increased risk of accidents among drivers (20). Drivers in this study reported a mean sleep duration of less than six hours, comparable to studies conducted in Thailand and Tehran, which demonstrated similar occupational challenges and their impact on sleep (14,15). This underscores the critical need to address sleep-related issues, as insufficient sleep not only affects the drivers' health but also poses a significant risk to road safety and public health (9).

Interestingly, lifestyle factors such as substance use and chronic illnesses did not show a significant association with poor sleep quality in this study, contrasting with findings from other regions (17). This variation suggests that regional differences in work environments and health management practices may influence sleep quality outcomes.

These may include optimizing work schedules, providing education on sleep hygiene, and implementing regular health screenings to identify and manage sleep disorders. Efforts to improve sleep quality among drivers will not only enhance their well-being but also reduce the risk of road traffic accidents, contributing to safer transportation systems (8,13).

Future research should consider longitudinal designs and incorporate objective measures of sleep, such as actigraphy or polysomnography, to better understand the causal relationships and dynamics of sleep quality in occupational settings (19).

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