Internship Training

at

International Institute of Health Management Research, New Delhi

Obstructive sleep apnea amongst heavy good vehicle drivers: a review of literature

by

Dr. Priyanka Joshi

PG/21/075

Under the guidance of

Dr. Ekta Saroha

PGDM (Hospital & Health Management)

2021-23

International Institute of Health Management Research

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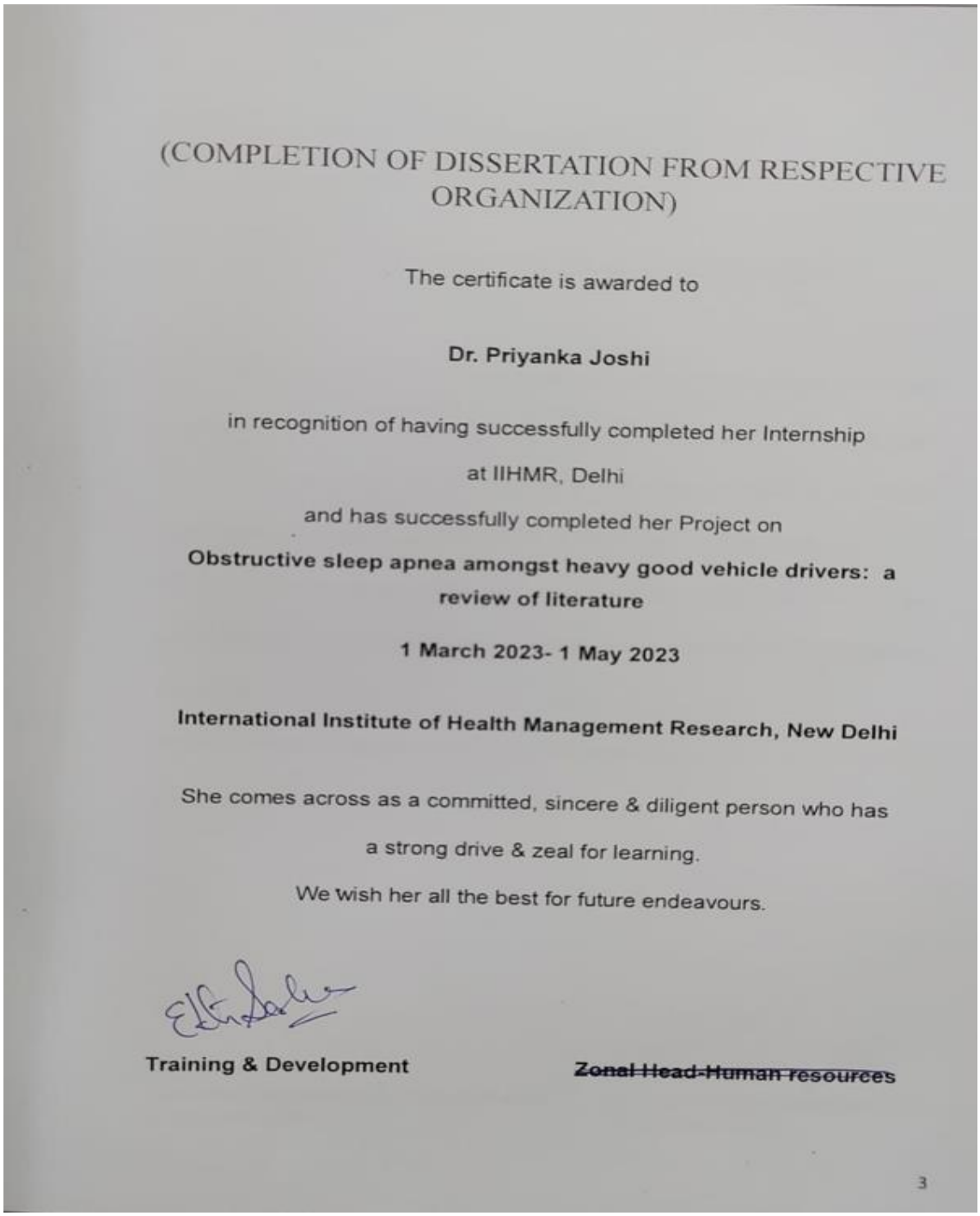
(COMPLETION OF DISSERTATION FROM RESPECTIVE ORGANIZATION)



(COMPLETION OF DISSERTATION FROM RESPECTIVE ORGANIZATION)

The certificate is awarded to

Dr. Priyanka Joshi

in recognition of having successfully completed her Internship

at IIHMR, Delhi

and has successfully completed her Project on

Obstructive sleep apnea amongst heavy good vehicle drivers: a review of literature

1 March 2023- 1 May 2023

International Institute of Health Management Research, New Delhi

She comes across as a committed, sincere & diligent person who has

a strong drive & zeal for learning.

We wish her all the best for future endeavours.

Training & Development

~~Zonal Head-Human resources~~

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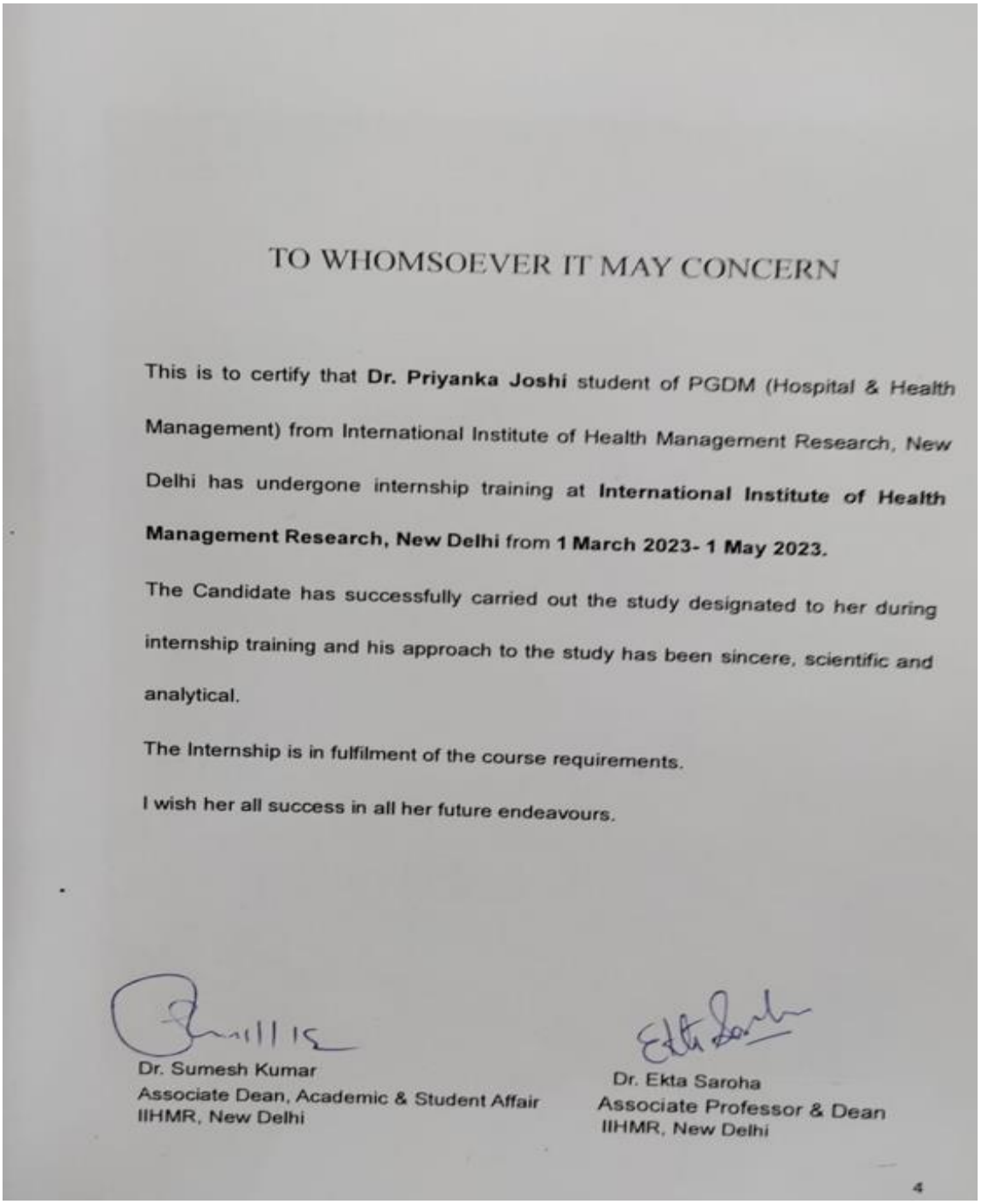
TO WHOMSOEVER IT MAY CONCERN



TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Priyanka Joshi** student of PGDM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone internship training at **International Institute of Health Management Research, New Delhi** from **1 March 2023- 1 May 2023.**

The Candidate has successfully carried out the study designated to her during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfilment of the course requirements.

I wish her all success in all her future endeavours.

Dr. Sumesh Kumar
Associate Dean, Academic & Student Affair
IIHMR, New Delhi

Dr. Ekta Saroha
Associate Professor & Dean
IIHMR, New Delhi

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Certificate of Approval

The following dissertation titled **"Obstructive sleep apnea amongst heavy goods vehicle drivers: A literature review"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	**Signature**
Dr Rohini Patil	Rohini
MUKESH RAVI RAUSHAN.	Raushan 17/06/23.
NAVEEN VASHIST	

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

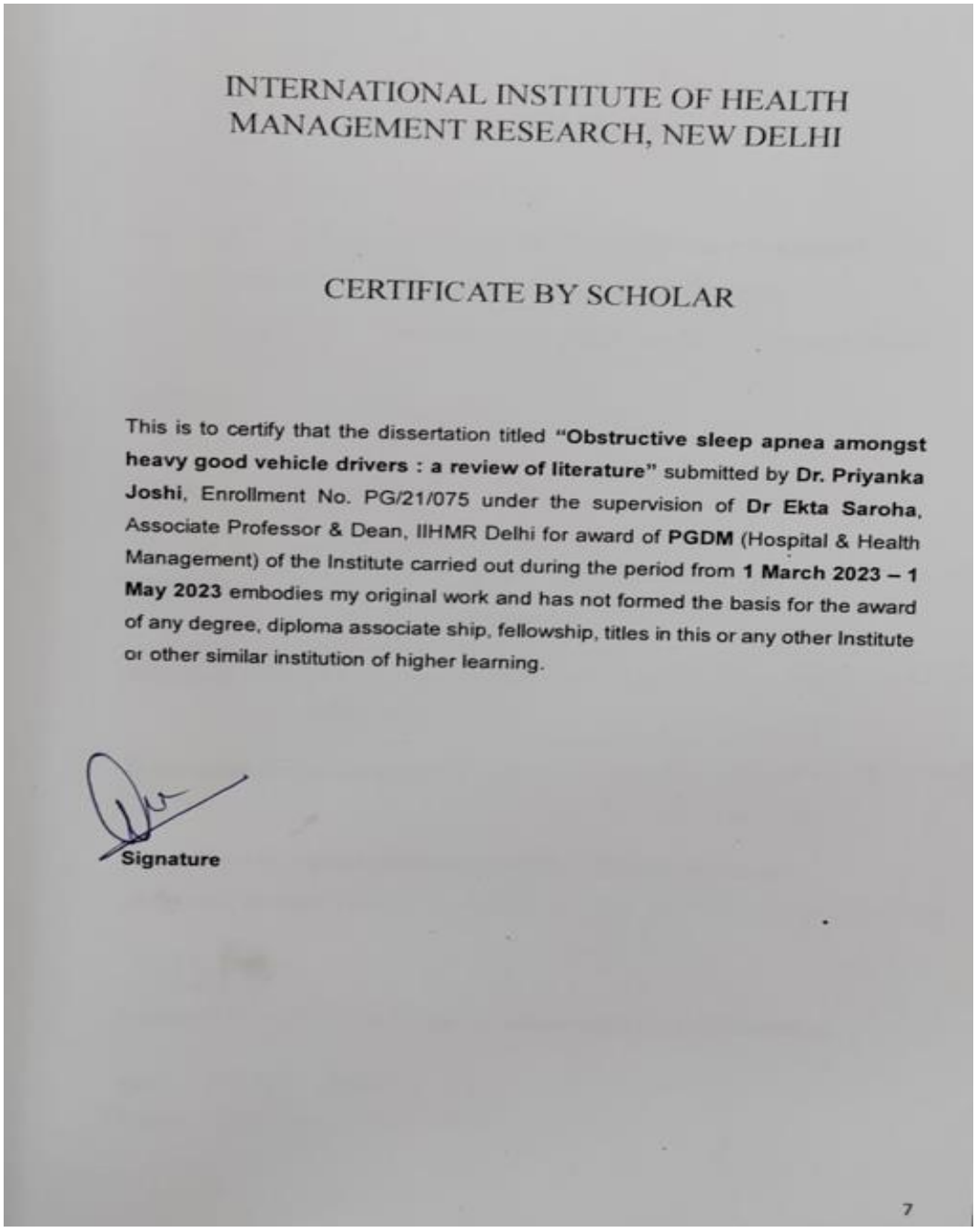
This is to certify that **Dr. Priyanka Joshi** a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. She is submitting this dissertation titled "**Obstructive sleep apnea amongst heavy good vehicle drivers : a review of literature**" in partial fulfilment of the requirements for the award of the **PGDM (Hospital & Health Management).**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr. Ekta Saroha
Associate Professor & Dean
IIHMR, New Delhi

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR



INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **"Obstructive sleep apnea amongst heavy good vehicle drivers : a review of literature"** submitted by **Dr. Priyanka Joshi**, Enrollment No. PG/21/075 under the supervision of **Dr Ekta Saroha**, Associate Professor & Dean, IIHMR Delhi for award of **PGDM** (Hospital & Health Management) of the Institute carried out during the period from **1 March 2023 – 1 May 2023** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature

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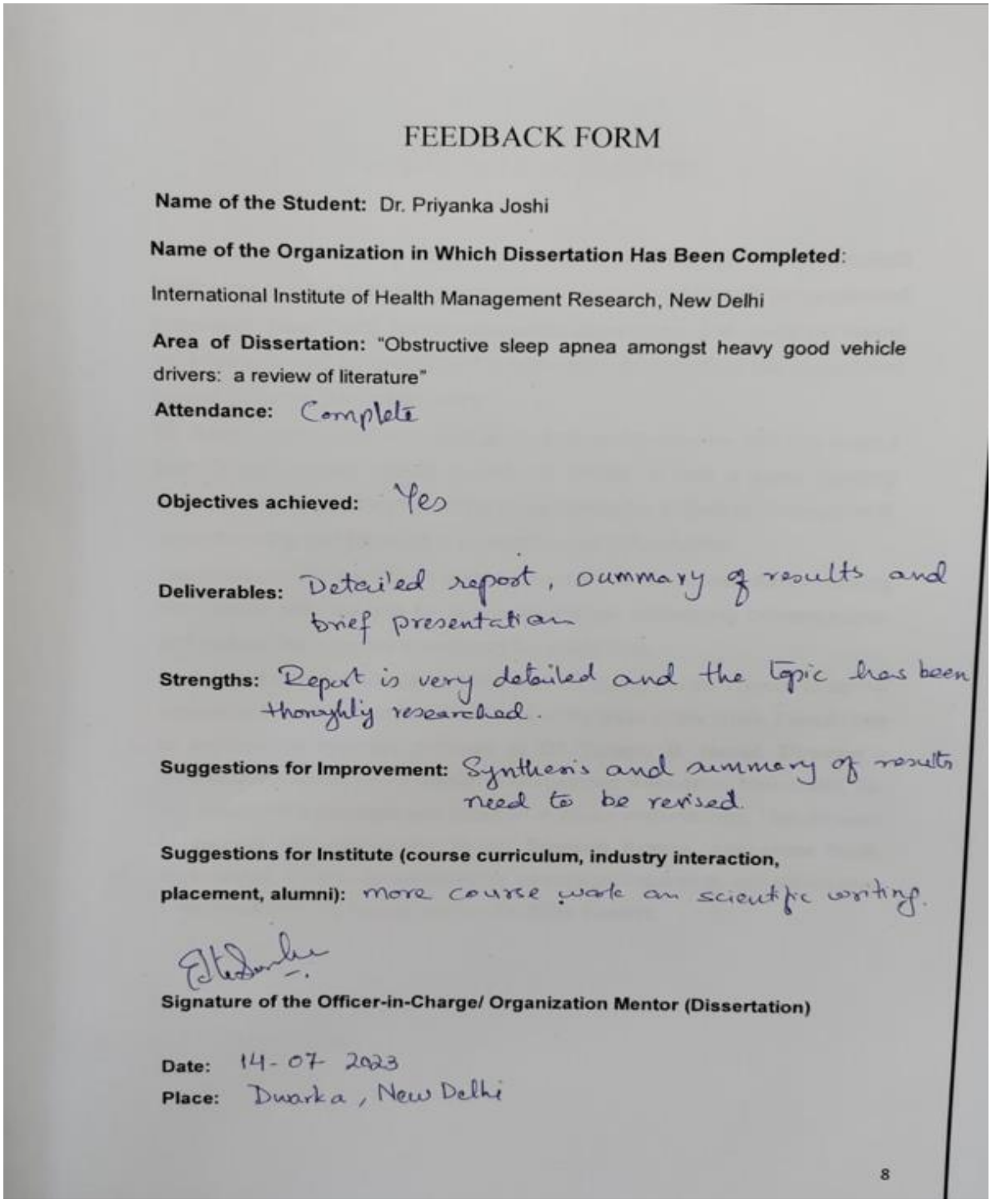
FEEDBACK FORM



FEEDBACK FORM

Name of the Student: Dr. Priyanka Joshi

Name of the Organization in Which Dissertation Has Been Completed:

International Institute of Health Management Research, New Delhi

Area of Dissertation: "Obstructive sleep apnea amongst heavy good vehicle drivers: a review of literature"

Attendance: Complete

Objectives achieved: Yes

Deliverables: Detailed report, summary of results and brief presentation

Strengths: Report is very detailed and the topic has been thoroughly researched.

Suggestions for Improvement: Synthesis and summary of results need to be revised.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni): more course work on scientific writing.

Signature of the Officer-in-Charge/ Organization Mentor (Dissertation)

Date: 14-07-2023

Place: Dwarka, New Delhi

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ACKNOWLEDGEMENTS

I would like to extend my sincere gratitude to **Dr. Ekta Saroha**, **Associate Professor** and **Dean** at the **International Institute of Health Management Research**, **New Delhi**, for her invaluable supervision and guidance during my internship and for providing the necessary details about the project that helped to shape the current work.

My thanks and appreciation also go to each and everyone, who has been a part of my 2-years PGDM journey at IIHMR, it was a great learning experience, I would also like to thank my **family** for all their encouragement, understanding and for being a constant support throughout.

I would especially want to extend my gratitude to **Mr. Adnan Ali** for walking this journey with me and for all the inspiration, stimulating conversations, and support he provided throughout the study time.

I am grateful to my institute, IIHMR Delhi, for giving me the chance to do my internship from the institute while I was in the thick of the crisis. I would like to express my heartfelt gratitude to **Dr. Sutapa B. Neogi**, **Director - International Institute of Health Management Research**, **New Delhi**, for her consistent inspiration and direction in all our undertakings. I would want to express my appreciation to **Dr. Sumesh Kumar**, **Associate Dean Academics**. I gratefully welcome the patronage, inspiration, and advice that I received from my faculty mentor, **Dr. Ekta Saroha.**

ABOUT THE ORGANIZATION

The International Institute of Health Management Research (IIHMR), New Delhi is allied to the 'Society for Indian Institute of Health Management Research' which was established in October 1984 under the Societies Registration Act-1958.

IIHMR-Delhi was setup in 2008 in response to the growing needs of sustainable management and administration solutions critical to the optimal function of healthcare sector both in India and in the Asia-Pacific region.

IIHMR Delhi are a leading institute of higher learning that promotes and conducts research in health and hospital management; lends technical expertise to policy analysis and formulation; develops effective strategies and facilitates efficient implementation; enhances human and institutional

capacity to build a competent and responsive healthcare sector. There multi-dimensional approach to capacity building is not limited to academic programs but offers management development programs, knowledge and skills-based training courses, seminars/webinars, workshops, and research studies.

There four core activities are…

- Academic courses at masters and doctoral level in health and hospital management to meet the growing need of skilled healthcare professionals.
- Research that has high relevance to health policies and programs at national and global level.
- Continued education through management development programs and executive programs for working professionals to help them upgrade their knowledge and skills in response to the emerging needs of the industry.
- Technical consultation to the national and state-level flagship programs to address the gaps in planning as well as implementation.

MISSION

IIHMR Delhi is an institution dedicated to the improvement in standards of health through better management of health care and related programs. It seeks to accomplish this through management research, training, consultation, and institutional networking in a national and global perspective.

VISION

IIHMR is a premier institute in health management education, training, research, program management and consulting in the health care sector globally. The Institute is known as a learning organization with its core values as quality, accountability, trust, transparency, sharing knowledge and information. The Institute aims to contribute to social equity and development through its commitment to support programs aiming at poor and the deprived population.

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INTRODUCTION

Obstructive sleep apnea (OSA) is a common medical condition and a form of sleep disordered breathing leading to repetitive complete or partial collapses characterized by reductions or pauses in breathing during sleep due to upper airway narrowing or closure. The apnea-hypopnea index (AHI), which measures the frequency of apneas and/or hypopneas per hour of sleep, is used to categorize the disorder as mild, moderate, and severe. This is evaluated using polysomnography (PSG) or other sleep monitoring techniques.[i]

According to numerous research, professional drivers have an OSA prevalence between 28% and 78% higher than the general population. The problem of driving when sleep deprived may be substantially worse for professional drivers.

The total number of sleep apneas and hypopneas is counted to determine the severity. As opposed to hypopnea, which is a reduction in airflow lasting longer than or equal to 10 seconds, the respiratory disturbance index (RDI) or apnea/hypopnea index (AHI) is used to measure breathing problems. AHI of fewer than five episodes per hour is regarded as normal; five to fifteen episodes per hour is deemed to be mild sleep apnea; fifteen to thirty episodes per hour is deemed to be moderate sleep apnea; and thirty or more episodes per hour is deemed to be severe sleep apnea.

People who have OSA may experience nocturia, excessive drowsiness throughout the day (EDS), sleeplessness, and morning headaches. Several questionnaires, like the Berlin Questionnaire and Epworth Sleepiness Scale (ESS), are available to identify individuals who are at high risk for OSA. However, the diagnosis is made by PSG or by home sleep monitoring, and the questionnaires are only of supplementary utility.

Mechanism of OSA

1. Episodes of cessation or marked reduction in breathing

2. Oxygen level falls and carbon dioxide rises
3. These changes are sensed by the brain and the subject is awakened, possibly to complete wakefulness
4. With awakening, the upper airway muscles are activated, the airway is opened, and breathing restarts
5. These repetitive arousals (awakenings) interrupt sleep and hence the quality of sleep – in – subjects with sleep apnea are reduced and sleep is not as refreshing, leaving a person with excessive daytime sleepiness.

Symptoms of OSA

Daytime symptoms	**Night- time symptoms**
Excessive daytime sleepiness	Snoring, gasping or choking in sleep
Fatigue	Witnessed apnea in sleep
Non – restorative sleep	Insomnia
Cognitive impairment	Restless sleep
Mood disorders	Night – time awakenings, dry mouth
Morning headaches	Nocturia
Impotence, erectile dysfunction	Nocturnal gastro – oesophageal reflux

Diagnosis of OSAS (A or B+C)

A = Excessive daytime sleepiness that is not explained by other factors

B = Two or more of the following that are not explained by other factors:

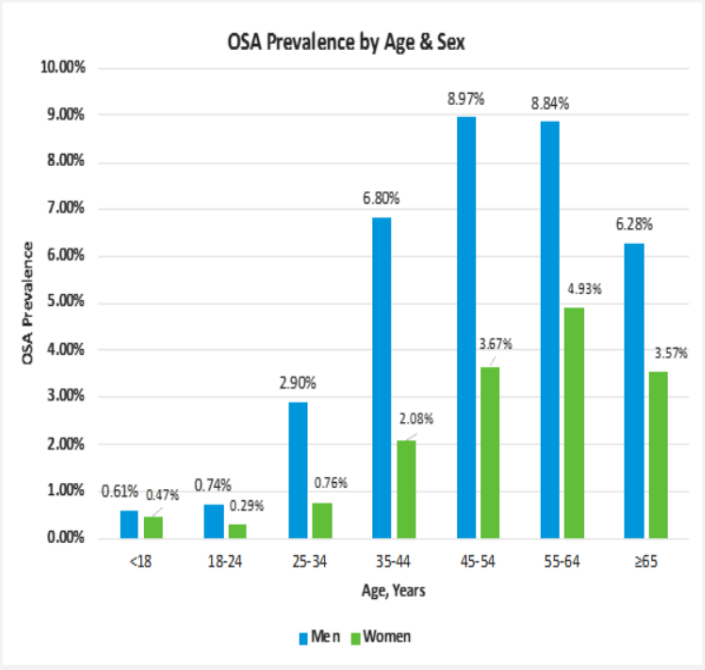
- Choking or Gasping during Sleep
- Recurrent awakenings from sleep
- Unrefreshing sleep
- Daytime fatigue
- Impaired concentration

C = Overnight monitoring demonstrates 5 to 10 or more obstructed breathing events/hour during sleep

The risk factors for OSA are obesity, aging, male sex, smoking, alcohol intake, and neck size greater than or equal to 17 inches. Many OSA patients experience greater daytime tiredness due to disruptions to their regular sleep habits. Epidemiological studies have established a link between OSA and driver fatigue and accidents, generally showing a two to seven times increased risk of road traffic accidents among non-commercial drivers with OSA.[ii]

Global Prevalence of Obstructive Sleep Apnea

Almost 1/7th of world's adult population is estimated to have OSA. The global prevalence of OSA, is AHI >_ 5 events/h, 711 – 961 million (moderate to severe OSA: 272-458 million)[iii] whereas the prevalence for OSA in India is **3 - 13.7%.** 10 countries with highest OSA prevalence of AHI >_ 5/h are China, USA, Brazil, **India**, Pakistan, Russia, Nigeria, Germany, France, and Japan, where India is the 2nd country with the highest OSA prevalence in terms of patients, over 29 million patients with prevalence estimate of 5.4% are seen in India (2020)



Source : Global burden of sleep-disordered breathing and its implications - Lyons - 2020 - Respirology - Wiley Online Library

There is emerging evidence that men in the age group of 18-65 years are at risk of OSA. Some professionals such as pilots who work on rotating shifts, heavy goods truck drivers, and commercial drivers are at greater risk of OSA. However, little is known about the relationship between OSA and sleepiness in commercial drivers, whether people with OSA are more likely

to be involved in car accidents, and whether having OSA interacts with other fatigue-promoting factors like sleep deprivation to make accidents more likely.

Heavy good vehicle drivers

The Motor Vehicle Act describes heavy good vehicles as, 'any goods carriage, gross vehicle weight of which or tractor or a road roller, whose weight exceeds 12,000 Kg. Total transport contribution to Gross value addition – 5%, out of which road transport contribution – 3.3%. In the category of impacting vehicles, truck/lorry has the 3rd highest share (12.3%) of total crashes (Ministry of Road Transport & Highways). In 2021, road accidents resulted in 1,53,972 fatalities and 3,84,48 injuries. Road accidents have the greatest impact on those between the ages of 18 and 45, who account for about 67% of all unintentional deaths.

Figure 1: Field visit to Transport Nagar

In terms of fatalities from traffic accidents, India leads the world. The average daily driving time was found to be 11.9 hours. According to a survey, 49% of drivers continue to operate motor vehicles while feeling sleepy or exhausted, 93% of respondents said they do not receive any social security benefits (such as provident funds, pensions, health insurance, life insurance, gratuities, etc.) in addition to their pay or wages. According to a (TOI) research, over 50% of Indian truck drivers reported health difficulties, while the lifetime prevalence of obstructive sleep apnea was 18.0%. (n = 372).

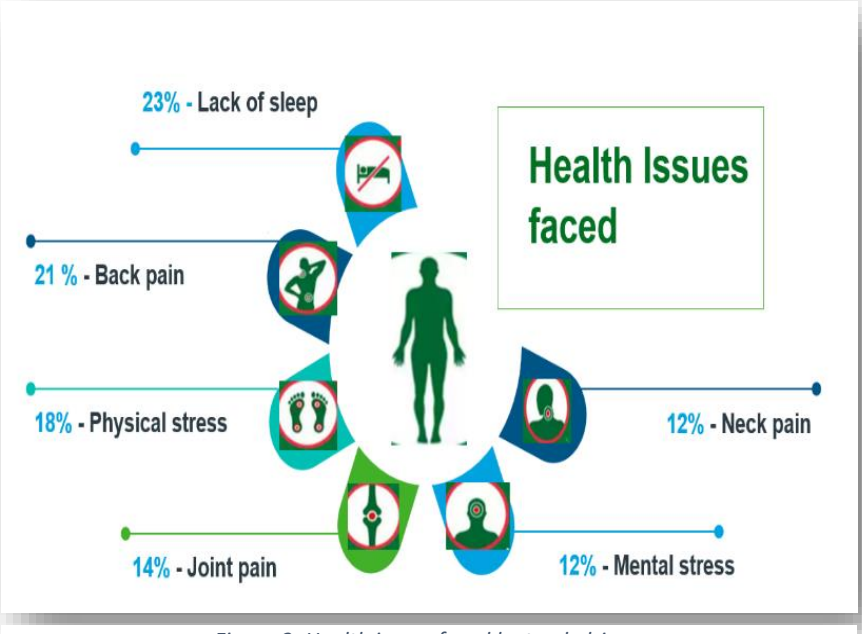
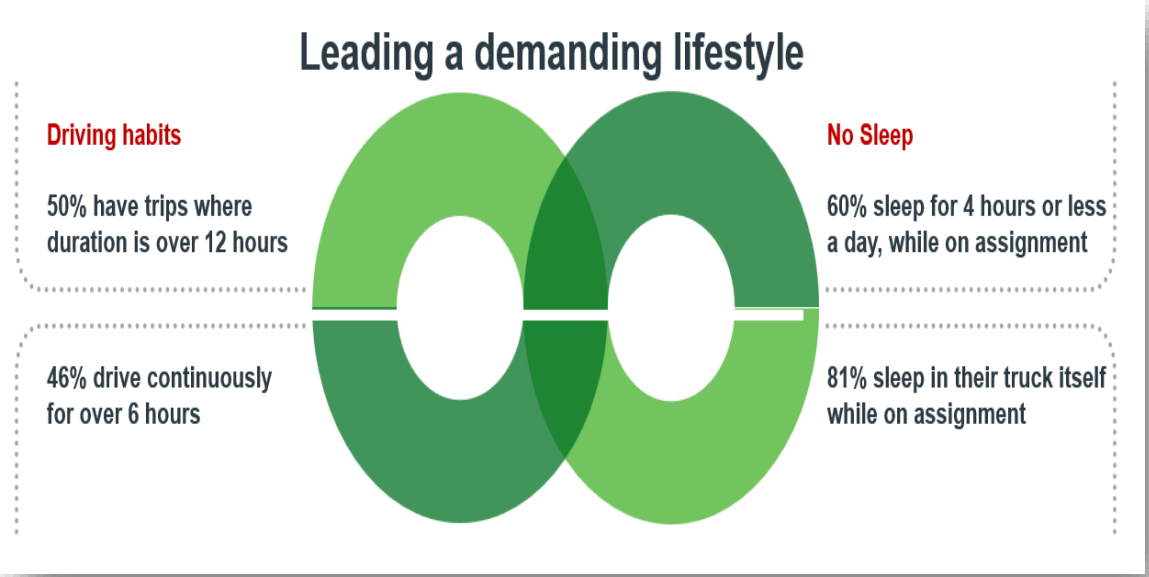


Figure 3: Health issues faced by truck drivers

A study by TOI says that, Back pain, Lack of sleep, Physical stress, Neck pain, Mental stress, Joint pain etc are some of the major health issues faced by truckers. Figure 1. Shows the percentage wise distribution of the following health issues.



As per a study by Save- life foundation India in 2018 of 1217 truck drivers half were in the age group of 26-40 years and 30% were 41-60 years old and only 10% were educated above high school….

Age-Group	N	Percentage
18-25 yrs.	161	13.2%
26-40 yrs.	674	55.4%
41-60 yrs.	364	29.9%
Above 60 yrs.	18	1.5%
Highest Qualification	**N**	**Percentage**
Illiterate	107	8.8%
Primary school level (Class 5th)	451	37.1%
High school level (Class 10th)	532	43.7%
Above high school level	127	10.4%
Marital Status	**N**	**Percentage**
Married	1013	83.2%
Single (Unmarried/ separated/ divorced/ widowed)	204	16.8%

Heavy vehicles play an important role in transportation because they deal with intra or interstate transportation. HGVs are the backbone of the supply chain in India because 70% of domestic transportation is done via this route. The Indian economy depends heavily on road freight transportation, which accounts for 4.5% of GDP. 90% of passenger traffic and 67% of freight are controlled by road transport, which is substantially greater than rail, sea and air combined. With urbanization, population growth, the emergence of e-commerce, and growing income levels, demand for goods is increasing. Trucks handle the majority of the transportation of goods, including 22% of agricultural goods, 39% of mining products, and 39% of manufacturing-related commodities. Estimated 3% men in India are HGV drivers. Health and well-being of HGV drivers is critical for road safety and prevention of non-communicable diseases such as hypertension, diabetes etc.

OBJECTIVES

01 To review the burden of obstructive sleep apnea among HGV in India

02 To highlight key points from obstructive sleep apnea, heavy good vehicles research in India

03 To recommend policies at various levels to address this cause & to recommend priority research topics for obstructive sleep apnea, heavy good vehicle drivers

METHODOLOGY

We searched PubMed and Google Scholar for peer-reviewed publications on OSA among HGV in India. The search was conducted from 3.04.2023 to 13.06.2023 with following search terms.

Following **filters** were applied on PubMed, Language: English; Humans; Date range; Article types:

- Systematic review
- Literature review
- Cross sectional study
- Narrative review
- Meta-analysis
- Cross-sectional studies
- Prospective and observational studies

English-language studies published. The inclusiveness guidelines were intended to be as sympathetic as feasible. studies on how frequently HGV drivers (who are 18 years of age or older) with OSAS who have been diagnosed by either polysomnography (PSG) questionnaires are involved in automobile accidents. The following conditions were excluded:

- Duplicate publications
- Studies reporting the prevalence of central sleep apnea only
- Studies analyzing the prevalence of sleep disorders without reference to driving accidents.
- Bibliography of most recent systematic review on OSA was scanned to access relevant literature.

The search strategy was modified to include/exclude the following

Using PubMed and Google Scholar, literature searches were conducted for the most recent 30 years, from 1993 to 2023, utilising free text and MeSH phrases. Subject headers, abstracts, and free-text search phrases were all combined to do each search. Several pre-searches were conducted in order to develop the final search strategy. The following keywords were used in the search strategy:

- ((Obstructive sleep apnea syndrome) AND (Truck Drivers))
- ((Obstructive sleep apnea) AND (HGV))
- (Sleep apnea) AND (Stop bang)
- (OSA) AND (India)
- (Sleepiness) AND (Truckers)

Number of reviewers – 1

Review of title – Abstract, complete article, free full text

Publication selection criteria

- HGV population
- Commercial drivers
- Heavy motor vehicle drivers
- Truckers
- Sleep apnea
- Road accidents
- Age ≥ 18 years
- Global

The following features of peer-reviewed publications were reviewed and summarized:

- Publication year
- Study population
- Type of review
- Publication year
- Study site

RESULTS

There have been remarkably few published scientific findings on the total incidence of OSA in Asia. As a result, the professional driver population, which has high rates of obesity and accompanying comorbidities, is understudied and medically underserved. HGV drivers in India are more likely to be middle-aged, male, and obese, which are the top three risk factors for OSA. According to several studies, professional drivers typically underreport OSA symptoms or exhibit resistance to OSA screening in order to avoid potential ramifications on medical certification and employment, economic implications of extra testing, and occupational consequences of lost work time[iv].

Table 1.

No table of figures entries found.	**n**	**%**
Peer-reviewed publications	30	100%
Cross sectional studies	9	30%
Systematic review	5	16.6%
Literature review	6	
Narrative review	3	20%
Rapid review	3	10%
Meta Analysis	3	10%
Integrated review	1	3%
Abstract review	2	6.6%

Table 2. Summary of studies

Ameer Batcha Wahida, Othman Ilhamah	**Author**
https://www.scirp.org/html/12-8202356_36049.htm	**References**
2013	**Year**
Malaysia	**Study site**
Commercial Vehicle drivers	**Study population**
OSA	**Outcome of interest**
Screening of risk group of OSA among truck drivers revealed that 14.6% (19) of drivers were categorized as having high risk of OSA while 85.4% (111) having low risk of OSA. While, in another study, polysomnography test among express bus drivers showed that 83 (28.7%) had mild OSA, 26 (9.0%) had AHI moderate OSA, and 19 drivers (6.6%) severe OSA.	**Predictors**
Cross sectional study	**Study design**
130	**Sample size**
With an alarming high prevalence, OSA should be a major road safety concern in this country.	**Key findings**
A special study focusing on sleep and fatigue related crashes may need to be conducted to complement the current studies and full implementation of existing efforts and initiatives to address OSA in road crashes should be realized by the relevant authorities.	**Recommendations from authors**

C R C Moreno · F A Carvalho
https://pubmed.ncbi.nlm.nih.gov/15646234/
2004
Saudi Arabia
Truck drivers
OSA
Approximately 26% of the truck drivers were found to be at high-risk group for OSA. An adjusted multiple logistic model found the independent risk factors of smoking (OR=1.16; p=0.014) and drug use (OR= 1.32; p < 0.0001) were associated with high risk for OSA. The presence of self-reported occasional (OR=0.62; p<0.0001) and regular (OR=0.53; p < 0.0001) physical activity was found to be an independent factor protective of OSA.
Cross sectional study
10,101
Educational programs, including ones aimed at improving one's health habits, such as engagement in physical exercise, should be considered in the development of initiatives to reduce the risk for OSA among the truck driver population.

Jon Tippin, JonDavid Sparks	R. Kamalesh , M. Krishnakumar
https://www.sciencedirect.com/science/article/abs/pii/S0022399909001299	https://www.sciencedirect.com/science/article/abs/pii/S2214140521000220
2009	2021
Abstract review	India
	Commercial Vehicle drivers
	OSA
OSA drivers showed reduced vigilance based on lower HR than comparison drivers, especially for peripheral targets (80.7±14.8% vs. 86.7±8.8%, *P*=.03). OSA drivers were sleepier at the end of the drive than comparison drivers (SSS=4.2±1.2 vs. 3.6±1.2, *P*=.03), and increased sleepiness correlated with decreased HR only in those with OSA (*r*=−0.49, *P*=.01). Lower HR and higher post-drive SSS predicted greater	the risk of OSA in commercial drivers and see the relationship with reaction times.
	Exploratory study
66	19371
We found that drivers with OSA have significantly impaired visual vigilance compared to drivers without neurological or sleep disorders. Vigilance is known to be impaired in many OSA subjects [6], [7], [8], [9], [27], [28], but our finding that vigilance tends to be	35% of the drivers were at risk for OSA. Drivers with high risk of OSA showed reduced auditory reaction time. Anthropometric measurements of the drivers with risk of OSA were significantly higher from those
	Prevalence of risk for OSA is high among commercial vehicle drivers, however it not the single risk factor contributing to collisions. OSA along with reduced reaction time could probably increases the risk of vehicular collisions.

Yong Han Ahn, Sangeun Lee	Surendra Kumar Sharma , Saket Kumpawat,
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8571888/	https://pubmed.ncbi.nlm.nih.gov/16840395/
2021	2006
Korea	delhi
Construction drivers	General population
Sleepiness	OSA
Driving fatigue (Adjusted Odds Ratio [aOR] = 1.08, 1.17), depressive symptoms (aOR = 0.91, 0.98), subjective sleep quality (aOR = 1.18 in moderate only), and driving over the speed limit (aOR = 1.43, 2.25) were significant factors for determining " moderate" and " severe" daytime sleepiness groups, respectively.	Multivariate analysis revealed that male gender, age, obesity (defined by a high body mass index), and waist/hip ratio as significant risk factors for OSAS.
Cross sectional study	Cross- sectional, community – based prevalence study
502	2150
Occupational health care providers should pay attention to development and implementation of health management interventions to reduce driving fatigue that incorporate the drivers' physical, mental, and occupational factors	The risk factors and prevalence for OSA in India are similar to those in the West,
Professional organizations need to establish internal regulations and public policies to promote health and safety among occupational drivers who specifically work at construction sites.	

J Clin Sleep Med	Emmadi V Reddy, Hemant Mishra
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3746711/	https://www.researchgate.net/publication/24220491_Prevalence_and_risk_factors_of_obstructive_sleep_apnea_among_middle-
2013	2009
Japan	India
Obese population	Middle aged Urbans
OSA	OSA
Review	Narrative study
308	2860
South Asians had significantly greater prevalence and severity of OSA than white Europeans	A linear trend was observed in the prevalence of OSA across the socioeconomic strata
OSA may contribute to increased cardiovascular risk in South Asians compared to white Europeans with severe obesity. Mechanisms mediating the observed associations between these ethnicities require further investigation.	OSA is a significant public health problem in the middle-aged Indian population across the socioeconomic spectrum. OSA is associated with some of the well known risk factors for cardiovascular disease.

Sajeesh Parameswaran , Arun C K
https://www.journalijar.com/article/25289/prevalence-of-sleep-disordered-breathing-and-excessive-day-time-
2018
India
Heavy vehicle drivers
Sleep disordered breathing
Cross sectional study
126
Drivers who met with RTA had a positive correlation with higher BMI, high Epworth Sleepiness score, snoring and SDB.

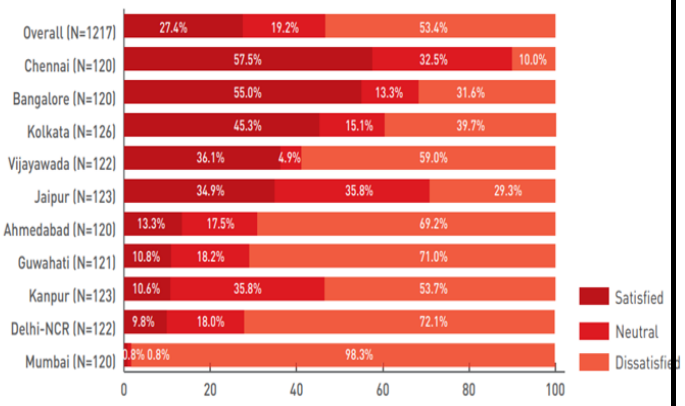
Drivers satisfaction with the driving profession

The top three reasons listed by satisfied drivers were:

- Easy money - **(55.7%)**
- Requirement of low educational qualification or technical knowledge - **(47.9%)**
- Freedom of work - **(44.3%)**

883 truck drivers were dissatisfied Reason for dissatisfaction:

- Unscheduled working hours
- High risk of death/injury on the job owing to road crashes, lack of safety on highways.



Methods to address fatigue/ sleepiness during trips

- **Total sample – 1217**
- **62%** of the truck drivers generally stop on highways to take rest/sleep
- **51%** take a brief stop for tea/snacks/refreshments
- **18.4%** stop for washing their face/drinking water
- **17.3%** halt for a smoke/tobacco/drugs

Cities	N	Generally stop and take rest	Take a brief stop for tea/ snacks/ refreshment	Wash face, drink water	Smoke/ chew tobacco/ drug etc.	Sing/ listen to music	Speak to khalasi/ helper	Co-driver/ khalasi takes over driving
Overall	1217	61.8	50.9	18.4	17.3	12.1	6.7	4.1
Jaipur	123	94.3	-	77.8	88.9	75.0	88.0	46.7
Ahmedabad	120	87.5	25.8	10.0	7.5	11.7	10.8	0.8
Bangalore	120	68.3	57.5	28.3	2.5	7.5	0.0	1.7
Delhi-NCR	122	65.6	38.5	1.6	17.2	1.6	0.0	3.3
Chennai	120	64.2	90.0	48.3	30.8	28.3	11.7	9.2
Kolkata	126	61.1	55.6	31.0	22.2	14.3	9.5	7.1
Kanpur	123	54.5	39.0	1.6	17.9	6.5	2.4	0.8
Mumbai	120	53.3	64.2	10.0	8.3	21.7	2.5	0.0
Guwahati	121	35.5	19.8	26.4	33.9	2.5	20.7	14.0
Vijayawada	122	33.6	45.9	15.6	13.1	9.8	8.2	3.3

Source: Status of truck drivers in India (Feb 2020)

Social security benefits to drivers

- **Total sample – 1217**
- **5.5% -** Life insurance
- **1.2% -** **H**ealth insurance
- **0.9% -** Provident fund
- **0.2% -** Pension
- **0.2% -** Bonus

Cities	N	None	Life insurance	Health insurance	Provident fund	Pension	Gratuity	Bonus
Overall	1217	93.2	5.5	1.2	0.9	0.2	0.2	0.2
Mumbai	120	100.0	-	-	-	-	-	-
Jaipur	123	99.2	-	0.8	-	-	-	-
Ahmedabad	120	99.2	-	0.8	0.8	-	-	-
Kanpur	123	98.4	-	0.8	0.8	0.8	-	-
Delhi-NCR	122	95.9	1.6	1.6	2.5	0.8	1.6	-
Vijayawada	122	95.9	-	3.3	0.8	-	-	-
Bangalore	120	92.5	5.8	1.7	-	-	0.8	-
Kolkata	126	88.1	10.3	0.8	-	0.8	-	1.6
Guwahati	121	84.3	15.7	-	-	-	-	-
Chennai	120	78.3	21.7	1.7	4.2	-	-	-

Source: Status of truck drivers in India (Feb 2020)

Reasons for crashes involving truck drivers

- Fatigue & sleepiness is the second most reason for road traffic accidents with – **38.7%**

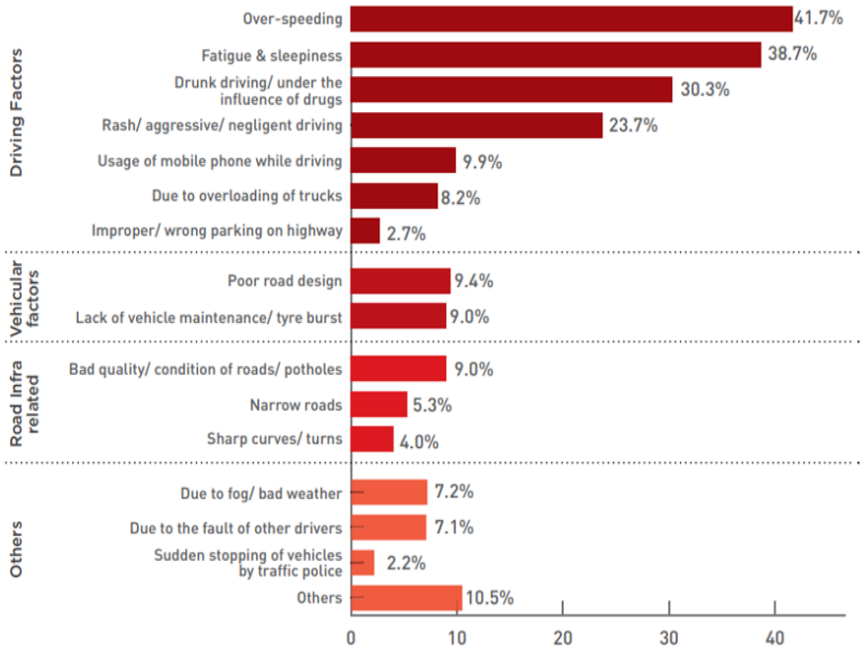
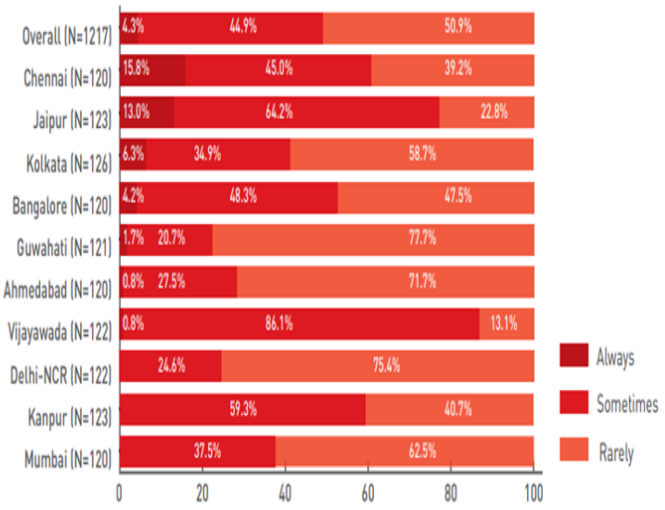


Figure 4: Source- Status of truck drivers in India (Feb 2020)

Driving even if fatigue or sleepy

- **51% -** Rarely drive when they feel fatigued or sleepy.
- **4%** - Always
- **45%** - Sometimes drive vehicles even if feeling fatigued or sleepy.



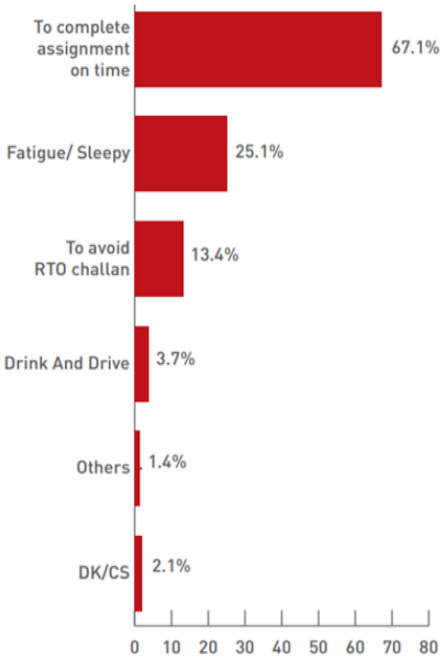
Reasons for over speeding

67.1% - Overburdened with assignments

25.1% - Feel fatigued/ sleepy while driving

13.4% - To avoid getting challaned

- Low availability of roadside amenities – Eat, Halt, Rest, **Sleep**, Medical emergency
- To finish the assignment on time, drivers compromise with their sleeping time



LIMITATIONS

- Restriction of search to free full text, did not allow to know the complete status of OSA in India, there's a huge scarce of research on this topic already and not reaching out to the paid articles restricted the research.
- Exclusion of Cohort, Case – control, RCT and other types of study

RECOMMENDATIONS

Based on the study –

More research is needed on this topic in India and other developing nations, as well as in the states of Punjab, Haryana, and other states with the biggest number of truck drivers.

Few of the research topics suggested-

1. Review on Obstructive sleep apnea amongst truckers' population in India
2. Prevalence of obstructive sleep apnea amongst HGV drivers
3. Study to find the correlation between environmental factors and sleep apnea
4. Study to find the correlation between lifestyle factors and sleep apnea in India
5. Comparison on prevalence of sleep apnea India v/s other developing countries

Recommendations from the literature studied-

1. Truck drivers should be subject to a structured compensation system, as well as mandated social security benefits such as insurance and provident funds.
2. The Motor Transport Workers Act should be followed when it comes to truck driver working hours.
3. Audit of transporters
4. Well-designed rest stations can benefit both truck drivers' health and road safety.

5. Tax exemptions to create a fund for the implementation of charity programme for truck drivers

6. Better facilities

7. Establish truck driving training schools

8. Strict enforcement of anti-corruption, bribery, and extortion legislation. Strict vigilance and regular highway patrolling

9. Raising awareness and sensitize department personnel to the dangers of corruption and unlawful practices.

(At authorities' level)

1. Online documents (new or renewed driver's license and permit, fitness certificate, automobile registration, and so on).
2. Monitor highway enforcement agents' behavior and corrupt practices (carry a camera at checkpoints or when issuing challans).
3. CCTV cameras should be deployed at numerous checkpoints and toll gates to keep an eye on unscrupulous authorities.
4. Highway patrols on a regular basis (to combat corruption and truck theft)
5. A dedicated helpline for truck drivers
6. The applicable Motor Vehicles (Amendment) Act 2019 requirements, as well as key traffic laws, shall be displayed on motorways, checkpoints, and toll plazas

(Transport associations & Fleet owners' level)

1. Hold programme and seminars on ----- for -----(maybe OSA awareness programs for the HGV business owners so that they understand the risk of OSA. Incentives from gov to HGV owners if they reduce long shifts for their drivers…

2. Public health education initiatives

3. Hold medical camps in collaboration with other parties involved

4. Transport groups, the government, and businesses should work together to improve the amenities available to truck drivers on highways

5. To educate truck drivers on safe driving practices and other traffic laws and regulations, fleet owners should urge them to attend road safety awareness programme

6. There is no pressure applied in regards to speedy delivery

DISCUSSION

Due to the current demographic issues of obesity in both adults and children as well as an ageing population, the worldwide burden of OSA is a significant contributor to the future health of all populations. The obesity problem is still widespread, but it is becoming more prevalent in China and India, the two most populated nations. Therefore, these patients are at risk for OSA to worsen even during more gradual changes in BMI. The traditional methods of risk assessment, diagnosis, and treatment do not appear to be able to meet this demand. The growth of telemedicine, at-home diagnostics, and novel diagnostic procedures, among other technological advancements, may make it feasible to better address the health and economic impacts of OSA and optimize the availability and efficiency of treatment.[v]

Male gender, older age, greater BMI, neck size, waist to hip ratio, raised blood pressure, smoking, snoring, trouble falling asleep, and a higher ESS score are all significant risk factors for OSA. Smoking is one of the main risk factors for cardiovascular disease and may raise the risk of cardiovascular disease associated with OSA.

OSA has been connected to a number of the most common medical conditions that cause morbidity, mortality, social expenses, and financial expenditures. Most studies indicate that treating OSA should be less costly than the negative effects on people's lives and the economy of not treating OSA. In addition to the advancements in our knowledge and understanding of OSA, it will be required to wisely utilize the technology available for diagnosing and treating OSA and its underlying comorbidities.

According to several studies, professional drivers typically underreport OSA symptoms or resist getting their condition evaluated in order to avoid possible repercussions on their medical certification and employment, the cost of additional testing and the occupational consequences of missed work time. Due to this, there is a significant need for effective screening technologies that can gather both subjective and objective information to help identify professional drivers who may be at risk for OSA early on and refer them to a sleep center with a solid reputation for managing OSA. Additionally, it is crucial to conduct routine clinical screenings by a qualified doctor, even when professional drivers do not report experiencing OSA symptoms, to further increase the commercial drivers' knowledge of the issue.[vi]

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