



Prevalence of Refractive Errors and Ocular Health Problems among Bus Drivers in Kolkata, West Bengal

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ABSTRACT:

The study titled "Prevalence of Refractive Errors and Ocular Health Problems Among Bus Drivers in Kolkata, West Bengal" delves into the intricate landscape of ocular health within the specific occupational context of bus drivers. With the primary objective of addressing a notable gap in current understanding, this research comprehensively examines the prevalence of refractive errors and other ocular health issues prevalent among bus drivers navigating the dynamic urban setting of Kolkata. Employing a meticulous mixed-methods approach, this study combines quantitative measures with qualitative insights to offer a nuanced exploration. The quantitative aspect encompasses precise assessments, including visual acuity evaluations and refractive error analyses, providing detailed clinical data on the ocular health status of bus drivers. Simultaneously, qualitative data is gathered through in-depth interviews, allowing for a rich exploration of bus drivers' subjective experiences and perceptions related to ocular health.

The significance of this research lies in its potential to uncover the multifaceted challenges faced by bus drivers in maintaining optimal vision for their demanding profession. By synthesizing quantitative metrics with qualitative narratives, the study aims to provide a holistic understanding of the prevalence of refractive errors and ocular health problems, enriching the academic discourse on occupational health. The implications of the findings extend to the realm of occupational health policies and targeted interventions tailored to enhance the visual well-being of bus drivers. This study contributes not only to academic knowledge but also serves as a practical guide for policymakers, healthcare professionals, and researchers seeking to formulate strategies addressing ocular health challenges unique to bus drivers in Kolkata. The research adheres to the highest standards of academic integrity, ensuring a reliable and insightful contribution to the field of occupational health.

Keywords: Ocular health, Refractive errors, Traffic safety, Eye strain, Visual discomfort, Occupational hazards, Vision-related symptoms, Eye health awareness, Corrective lenses, Occupational vision, Driver safety, Refractive corrections, Work-related vision issues.

Introduction:

The vibrant city of Kolkata, West Bengal, is not only known for its cultural richness but also for its intricate network of public transportation. At the heart of this bustling urban milieu are the dedicated bus drivers, the unsung heroes navigating the labyrinthine streets to ensure the smooth movement of countless passengers daily. In the midst of their demanding roles, the often-overlooked aspect of their ocular health emerges as a crucial determinant of their occupational well-being.

Bus driving, as a profession, places immense visual demands on individuals, necessitating keen visual acuity and sustained attention to navigate through the complexities of urban traffic. However, the prevalence of refractive errors and other ocular health issues among bus drivers poses a significant and underexplored challenge. Uncorrected refractive errors, including myopia and hyperopia, have the potential to impair their ability to decipher crucial road signs, recognize passengers, and respond swiftly to the dynamic flow of city traffic. Furthermore, the prolonged exposure to visual stressors inherent in urban driving may contribute to a range of eye-related discomfort and fatigue. This research embarks on a comprehensive exploration into the ocular health landscape of bus drivers in Kolkata, aiming to shed light on the prevalence of refractive errors and other ocular health problems. By adopting a dual-pronged approach encompassing both quantitative assessments and qualitative insights, this study seeks not only to quantify the prevalence of ocular health issues but also to unravel the nuanced dimensions of these challenges in the everyday lives of bus drivers. In the quantitative realm, rigorous measurements of visual acuity, refractive errors, and the identification of prevalent ocular health problems will form the bedrock of our investigation. Simultaneously, the qualitative dimension of this study will involve in-depth interviews, providing a platform for bus drivers to articulate their lived experiences and perceptions regarding their ocular health. This mixed-methods approach promises a comprehensive understanding that extends beyond statistical metrics to encompass the intricate interplay of ocular health issues within the broader context of bus drivers' professional lives. As the findings of this research unfold, they hold the potential to contribute valuable insights to the field of occupational health. By unraveling the ocular health challenges

faced by bus drivers, this study seeks to advocate for targeted interventions, informed policy changes, and a heightened understanding of the symbiotic relationship between occupational demands and visual well-being. Beyond the immediate scope of Kolkata, the outcomes of this research aim to provide a template for similar studies in diverse urban settings, sparking a broader conversation on the intersection of occupation and eye health.

Methodology:

study area:

West Bengal is a state in India, and its capital city is Kolkata. Among the 23 districts of West Bengal, Kolkata is one of them. However, the total Kolkata region comprises the Kolkata district along with parts of South 24 Pargana's and North 24 Pargana's districts. The district headquarters for Kolkata is located in Kolkata city, whereas the headquarters for South 24 Pargana's is situated in Alipore, and for North 24 Pargana's, it is located in Barasat. The combined area of these three districts is 14,239 square kilometers (145 + 9,960 + 4,094), and their total population is 22,722,707. Since Kolkata is the capital city of West Bengal, it serves as the hub of most of the state's economic activities. As a result, commercial transportation plays a crucial role in facilitating daily commuting, and bus drivers significantly contribute to the economic life of both Kolkata city and its surrounding regions.

Study design:

A descriptive cross-sectional study was conducted from October 5, 2022, to March 5, 2023, involving 2,141 commercial bus drivers in Kolkata City. The research took place across various bus depots within Kolkata, the capital of West Bengal.

Sample size:

All commercial bus drivers from 29 bus depots in Kolkata, West Bengal, India, who gave their consent and attended the screening exercise, were included in the study.

Ethical clearance:

Approval for the study was granted by the institutional ethics committee. The study population consisted of commercial drivers available in the study area. Eye screening camps were organized in the 29 bus depots of Kolkata city for data collection, and all bus drivers from these depots were invited. However, only those drivers who attended the camps were considered as the sample for this study, with their consent. The purpose of this study was primary data collection and providing eye care services to bus drivers. The eye screening camps were organized in consultation with the representatives of each bus drivers' association from the respective depots.

Data collection and management:

Demographic information was collected, and participants were verbally asked a series of questions about their educational background, income level, driving experience (in years), type of driving license, daily driving hours and distances, vision issues, general health history, and any self-reported road traffic accidents while operating a bus or minibus. Additionally, data on presenting visual acuity, refractive errors, and ocular conditions identified during eye examinations were documented for each eye. A trained data entry professional recorded the demographic, clinical, and questionnaire responses in Microsoft Excel 2016.

Eye health screening and ocular examination included the following assessments:

Presenting Visual Acuity (PVA): This was measured for each eye separately using Snellen's chart for distance vision and near vision optotypes for near vision. An eye occluder was used, and the test was conducted at a distance of 6 meters in broad daylight.

- 1) Vision Assessment: Each eye was tested without any aids. If vision was less than 6/6, it was further tested using a pinhole and spectacles if available. Improvement in visual acuity with a pinhole was identified as refractive error.
- 2) Visual Acuity Classification: Visual acuity between 6/6 and 6/18 was classified as normal. Visual acuity ranging from below 6/18 to 6/60 was defined as moderate visual impairment, whereas levels between less than 6/60 and 3/60 were classified as severe visual impairment. Vision below 3/60 was identified as blindness.
- 3) Best Corrected Visual Acuity (BCVA): This was determined as the visual acuity achieved with refractive correction, measured using a Snellen's chart. The refractive status was evaluated using a streak retinoscope.
- 4) Colour Vision Testing: Ishihara's pseudoisochromatic charts were used to evaluate color vision.
- 5) Intraocular Pressure Measurement: Digital palpation was used to assess intraocular pressure, followed by a Schiötz tonometer for precise measurement.
- 6) Anterior Segment Examination: A pen torch and magnifying head loupe were used to examine the anterior segment of the eye.
- 7) Posterior Segment Examination: A direct ophthalmoscope was employed to examine the posterior segment.

Data analysis:

The data was entered into a Microsoft Excel spreadsheet and analyzed using IBM SPSS (Statistical Package for the Social Sciences). Categorical variables were summarized using descriptive statistics, including frequencies and percentages. Myopia and hyperopia were identified based on documented clinical diagnoses during the examination and/or the prescription of corrective lenses with negative or positive refractive power, respectively. Presbyopia was defined by a clinical diagnosis during the examination and/or the prescription of an additional power for near vision correction in spectacles. If participants were wearing spectacles, their presenting visual acuity was recorded. Visual impairment, either near or distant, was defined as the inability to meet the presenting distance vision standard for bus drivers ($\geq 6/7.5$ in the better eye) and/or the presence of presbyopia.

Approval for the study was granted by the institutional ethics committee.

Visual acuity ranging from below 6/18 to 6/60 was defined as moderate visual impairment, whereas levels between less than 6/60 and 3/60 were classified as severe visual impairment.

The refractive status was evaluated using a streak retinoscope.

RESULTS:**Socio-demographic characteristics of the drivers:**

The provided data presents a comprehensive demographic and occupational profile of bus drivers, focusing on various aspects such as age distribution, education level, marital status, type of driving license, vehicle types driven, daily driving duration, distance covered, income levels, and history of road traffic accidents. These insights offer valuable perspectives on the drivers' background, working conditions, and potential factors influencing their occupational experiences and safety. In terms of age distribution, the majority of the drivers fall within the age range of 40-59 years, comprising 66% of the sample population. This highlights a workforce largely in mid-life, which could imply a balance of experience and physical capability. Notably, younger drivers aged 20-29 constitute only 4.75%, suggesting limited entry of younger individuals into this profession. Conversely, those aged 60-69 form 14.83%, indicating some retention of older, potentially more experienced drivers in the workforce. Educational status reveals that a significant proportion of drivers, 67.58%, have no formal education, while those with primary education account for 15.92%. Secondary and tertiary education levels are reported among 10.50% and 6.00% of drivers, respectively. This data suggests that the profession is dominated by individuals with limited formal educational qualifications, possibly reflecting the barriers to higher education within this workforce or the perception of driving as a profession accessible with minimal educational prerequisites. Marital status data shows that 84.58% of the drivers are married, suggesting that the profession may attract individuals seeking stable income sources to support their families. Single drivers comprise 9.42%, while divorced, widowed, and separated drivers collectively form a small percentage of the workforce. This marital distribution may reflect cultural or societal norms influencing job preferences based on marital responsibilities. Regarding licensing, a majority of drivers (50.58%) hold licenses for light and medium vehicles, while 19.75% are licensed for professional heavy vehicles. Interestingly, 5.5% of drivers lack any license, raising concerns about regulatory compliance and potential safety risks. Other license categories include general professional licenses at 21.08% and a smaller subset holding specialized professional licenses (3.08%). The type of vehicle driven indicates a clear preference for buses, with 75% of the drivers operating these larger vehicles, while the remaining 25% drive mini buses. This distribution suggests the predominance of full-sized buses in public or private transport services. When analyzing daily driving durations, the data reveals that nearly half (48.75%) of the drivers spend 15-16 hours on the road. This long driving period raises significant concerns about driver fatigue and its impact on safety. Other time intervals, such as 13-14 hours (14.17%) and 14-15 hours (19.92%), also demonstrate extended working hours, underscoring the demanding nature of the profession. Shorter driving durations, ranging from 10-13 hours, are rare among this group. Driving distances per day show considerable variation, with the most common range being 144-162 km (25% of drivers). Other frequent ranges include 153-170 km (12.5%) and 152-171 km (8.33%). Such distances reflect the extensive travel demands on drivers, potentially contributing to physical and mental strain over time. Income levels indicate that a significant proportion of drivers earn between 14,000 and 18,000 Rupees monthly, accounting for 62.5% of the sample. A smaller proportion earns higher incomes, with some drivers reporting earnings up to 30,000 Rupees. The income distribution suggests a relatively modest earning potential for most drivers, which might be reflective of the industry standards or the regions surveyed. The data on road traffic accidents (RTA) reveals that 61.5% of driver's report having a history of RTAs. This high proportion underscores the potential risks associated with the profession and highlights the need for targeted interventions, such as safety training, stricter regulatory enforcement, and improved working conditions to mitigate accident rates. Overall, this analysis paints a detailed picture of bus drivers' demographics, working conditions, and associated challenges. The insights can guide policy improvements in areas like education, licensing, and workplace safety to enhance the overall wellbeing and performance of drivers while reducing road traffic risks. See Table 1.

Table 1**Socio-demographic characteristics of drivers in Kolkata, West Bengal.**

Variable	Frequency (n=1200)	Percentage
Age Group (y):		
20-29	57	4.75

30-39	173	14.42
40-49	359	29.92
50-59	433	36.08
60-69	178	14.83
Total	1200	
Educational Status		
No formal education	811	67.58
Primary	191	15.92
Secondary	126	10.50
Tertiary	72	6.00
Total	1200	
Marital Status		
Married	1015	84.58
Single	113	9.42
Divorced	30	2.50
Widower	28	2.33
Separated	14	1.17
Total	1200	
Type of Driving License		
No License	66	5.5
Professional	253	21.08
Professional	37	3.08
Professional heavy Vehicles	237	19.75
Professional Light and Medium Vehicle	607	50.58
Total	1200	
Type of Bus Driven		
Bus	900	75
Mini bus	300	25
Total	1200	
Duration of Driving Per Day (h)		
10-11	3	0.25
12-13	1	0.083
13 – 14	15	1.25
13-14	170	14.17
13-16	1	0.083

14 – 15	1	0.083
14 – 15	20	1.67
14-15	239	19.92
14-16	1	0.083
15 – 16	2	0.17
15 - 16	7	0.59
15 – 16	47	3.92
15-16	585	48.75
16 – 17	1	0.083
16 – 17	7	0.58
16-17	100	8.33
Total	1200	
Driving Distance Per Day (km)		
135-162 km	50	4.12
140-175 km	50	4.12
144-160 km	50	4.12
144-162 km	300	25
147-196 km	50	4.12
150-175 km	25	2.08
150-175 km	25	2.08
150-180 km	50	4.17
152-171 km	100	8.33
153-170 km	150	12.5
154-176 km	100	8.33
160-180 km	100	8.33
161-184 km	100	8.33
168-189 km	50	4.17
Total	1200	
Self-Reported Monthly Income (Average)		
14000-15000 Rupees	200	16.67
15000-16000 Rupees	300	25
16000-17000 Rupees	100	8.33
17000-18000 Rupees	150	12.5
19000-20000 Rupees	100	8.33
21000-22000 Rupees	100	8.33
23000-24000 Rupees	100	8.33
24000-25000 Rupees	50	4.17

25000-26000 Rupees	50	4.17
29000-30000 Rupees	50	4.17
Total	1200	
Self-Reported History of Road Traffic Accident (RTA)		
No	462	38.5
Yes	738	61.5
Total	1200	

Ocular symptoms/complaints: The drivers were asked if they had any ocular symptoms and if yes, the type of symptoms they had. The table presents a detailed analysis of ocular symptoms reported among a sample of 1,200 cases, showcasing their frequencies and percentages. Blurred vision emerges as the most reported symptom, affecting 16.42% of individuals (197 cases), likely due to its association with common conditions such as refractive errors, prolonged screen use, or systemic health issues like diabetes. Tearing, at 12.17% (146 cases), represents the second most prevalent symptom and may result from irritation, allergies, or dry eye syndrome, reflecting the complexity of tear production issues. Redness follows closely, accounting for 11.75% (141 cases), and is often linked to inflammation, infections like conjunctivitis, or environmental irritants such as smoke and pollution. Headaches, experienced by 8.42% (101 cases), are commonly associated with eye strain, uncorrected refractive errors, or sinus-related pressure, emphasizing the importance of regular eye exams. Eye pain, which affects 8.33% (100 cases), signals potentially serious conditions such as glaucoma or uveitis and underscores the need for prompt medical attention. Itching, reported by 7.92% (95 cases), is a frequent symptom of allergies or dry eyes and is a notable discomfort that can worsen without treatment. Foreign body (FB) sensation, present in 7.25% (87 cases), often arises from dry eye syndrome or exposure to irritants, causing significant distress to patients. Eye strain, which impacts 7.17% (86 cases), highlights the challenges of modern lifestyles dominated by screen use, where prolonged near-vision tasks strain ocular muscles. Irritation, seen in 5.92% (71 cases), is a broad symptom often linked to environmental factors like dust, wind, or pollution, commonly overlapping with other complaints such as redness or tearing. A burning sensation, experienced by 5.75% (69 cases), typically indicates dry eyes or allergic reactions and is exacerbated by environmental factors like smoke or chlorinated water. Dry eyes, though less frequent at 5.25% (63 cases), have a significant impact, often caused by tear film instability due to aging, hormonal changes, or prolonged digital exposure. Finally, eyeache, reported in 3.67% (44 cases), is the least frequent but still noteworthy, often arising from overuse, sinus infections, or ocular muscle strain. Collectively, these symptoms reflect a diverse range of ocular challenges, from mild irritations to potentially severe conditions, highlighting the need for targeted interventions, preventive care, and public awareness to address the underlying causes effectively. The data underscores the prevalence of common symptoms like blurred vision, tearing, and redness while drawing attention to the less frequent but equally impactful complaints like dry eyes and Eyeache, emphasizing the multifactorial nature of ocular health issues and the importance of tailored management strategies. See table 1.

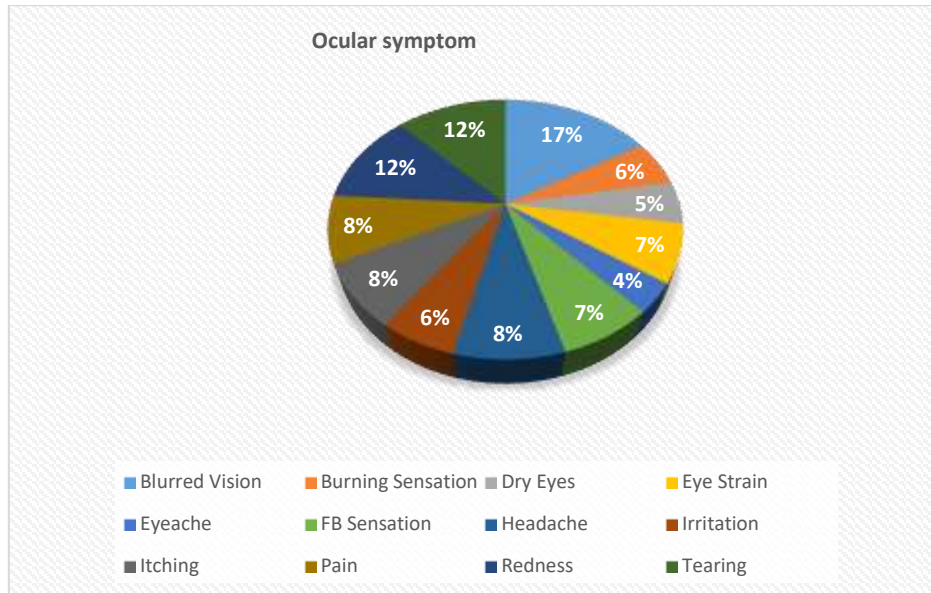
Table 2

Ocular symptoms of drivers.

Ocular symptoms	Frequency	Percentages
Blurred Vision	197	16.42
Burning Sensation	69	5.75
Dry Eyes	63	5.25
Eye Strain	86	7.17
Eyeache	44	3.67
FB Sensation	87	7.25
Headache	101	8.42
Irritation	71	5.92
Itching	95	7.92
Pain	100	8.33
Redness	141	11.75
Tearing	146	12.17
Total	1200	

Some peoples had more than one ocular symptom.

Pie chart for ocular symptoms: The pie chart provides a visual representation of the distribution of ocular symptoms among a population, highlighting the relative prevalence of various complaints. Blurred vision stands out as the most common symptom, accounting for 17% of cases, reflecting its significant association with refractive errors or screen-related eye strain. Tearing and redness follow closely, at 12% each, indicative of irritation, allergies, or infections. Symptoms such as headache, pain, and itching, each contributing 8%, demonstrate the multifaceted nature of ocular discomfort, often linked to digital eye strain or inflammatory conditions. Moderate symptoms like foreign body sensation and eye strain, both at 7%, suggest issues arising from environmental factors or prolonged near work. Less frequent but notable symptoms include irritation (6%), burning sensation (5%), and dry eyes (4%), which are often connected to environmental exposure, tear film instability, or allergies. Overall, the chart emphasizes the need for preventive measures, better eye care practices, and timely interventions to address these diverse and impactful symptoms.

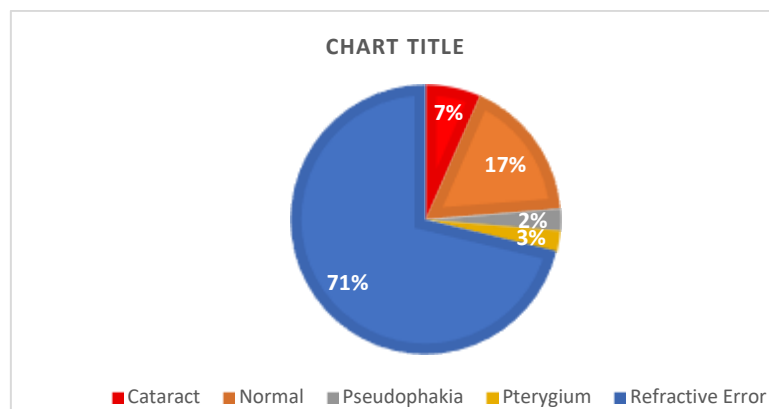


Provisional diagnosis of the eyes: The data presents a comprehensive overview of the diagnoses for the right eye (RE) and left eye (LE) across 1,200 cases, shedding light on the prevalence of various ocular conditions and their implications for visual health. Refractive errors dominate the findings, with 71.25% of right eyes and 70.83% of left eyes diagnosed with this condition. This overwhelming majority underscores the critical role of refractive issues as a leading cause of visual impairment. These include conditions such as myopia, hyperopia, and astigmatism, which are often exacerbated by the widespread use of digital devices, lifestyle changes, and a lack of regular vision screenings. The high prevalence of refractive errors highlights the urgent need for affordable and accessible corrective measures, such as glasses, contact lenses, or refractive surgeries, to improve visual quality and reduce the burden of uncorrected vision problems. Normal diagnoses were observed in 17.17% of right eyes and 17.08% of left eyes, representing a significant portion of individuals with healthy eye conditions. This finding is encouraging, as it reflects a reasonable proportion of individuals without any major pathological issues, emphasizing the importance of maintaining eye health through preventive care, regular eye check-ups, and protective measures against environmental and occupational hazards. Cataracts, a leading cause of blindness worldwide, were identified in 6.58% of right eyes and 6.08% of left eyes. Cataracts are characterized by the clouding of the eye's natural lens and are often age-related, though they may also result from diabetes, prolonged exposure to UV light, or certain medications. These findings highlight the importance of cataract awareness and the availability of surgical options like cataract extraction, which can restore vision effectively when performed in a timely manner. Pseudophakia, where the natural lens has been replaced with an artificial intraocular lens following cataract surgery, was found in 2.50% of right eyes and 2.83% of left eyes. The presence of Pseudophakia reflects the success of surgical interventions for cataracts and emphasizes the importance of postoperative care and follow-up to ensure optimal visual outcomes. Pterygium, observed in 2.50% of right eyes and 3.17% of left eyes, represents a relatively smaller but significant proportion of cases. This condition, characterized by a growth of tissue on the conjunctiva that can extend onto the cornea, is often associated with prolonged exposure to UV radiation, wind, or dust. The findings underscore the need for public awareness about protective measures, such as wearing UV-blocking sunglasses and avoiding excessive exposure to harmful environmental factors. Overall, the data reveals that refractive errors remain the predominant diagnosis, requiring widespread public health initiatives to improve access to corrective measures and routine vision screening. Meanwhile, the significant prevalence of cataracts highlights the need for increased availability of cataract surgeries and postoperative care to prevent avoidable blindness. The findings related to Pterygium and Pseudophakia also emphasize the importance of early detection, prevention, and treatment of these conditions. By addressing these issues comprehensively, through education, preventive measures, and accessible healthcare services, the burden of visual impairment can be significantly reduced, ultimately improving the quality of life for individuals affected by these conditions. See Table 2.

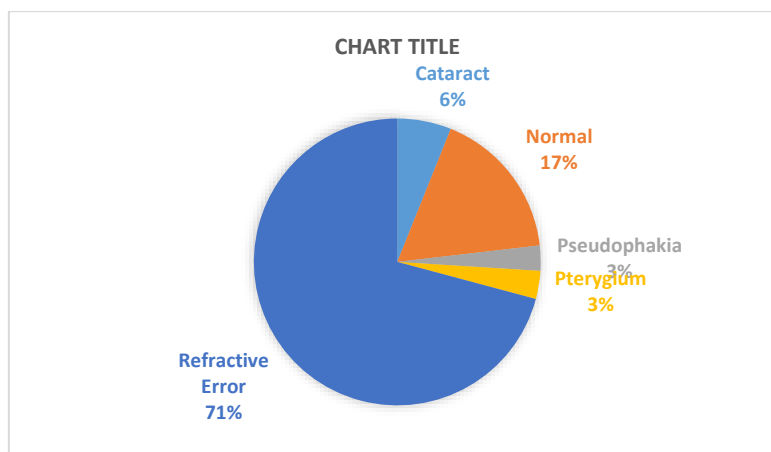
Table 2

Distribution of provisional diagnosis among participant's diagnosis.

Diagnosis-RE	Frequency	Percentages	Diagnosis-LE	Frequency	Percentages
Cataract	79	6.58	Cataract	73	6.08
Normal	206	17.17	Normal	205	17.08
Pseudophakia	30	2.50	Pseudophakia	34	2.83
Pterygium	30	2.50	Pterygium	38	3.17
Refractive Error	855	71.25	Refractive Errors	850	70.83
Total	1200			1200	



Pie chart for ocular diagnosis of Right eye: The pie chart illustrates the distribution of ocular diagnoses, with refractive errors overwhelmingly representing the largest proportion at 71%, highlighting their status as the most common visual condition requiring correction. Normal eye diagnoses account for 17%, indicating a considerable portion of individuals with no significant ocular abnormalities. Cataracts, a major cause of visual impairment, constitute 7%, reflecting the importance of surgical intervention to address this condition. Pterygium, a condition caused by environmental factors such as UV exposure, contributes 3%, while Pseudophakia, representing post-cataract surgical cases with intraocular lens implants, accounts for 2%. The chart underscores the critical need for accessible eye care services, especially for refractive errors and cataract management, while also emphasizing the value of preventive measures for maintaining overall ocular health.



Pie chart for ocular diagnosis of Left eye: The provided pie chart illustrates the distribution of different ocular conditions in a population. The dominant condition, representing 71% of cases, is refractive error. This high percentage emphasizes the widespread nature of refractive issues such as myopia, hyperopia, and astigmatism, which are common visual impairments often correctable with glasses, contact lenses, or refractive surgery. Normal vision accounts for 17%, showing that a relatively small segment of the population does not require any form of vision correction or medical intervention. Cataracts, affecting 6%, are the third most prevalent condition, highlighting a significant public health concern as cataracts remain one of the leading causes of blindness worldwide, particularly in aging populations. Pterygium, at 3%, represents a less common but notable issue, often linked to environmental factors such as prolonged exposure to UV light or dusty conditions, and it may require surgical management in severe cases. Pseudophakia, also at 3%, refers to individuals with artificial lenses implanted following cataract surgery, indicating a subset of the population that has undergone medical intervention to restore vision. The chart underscores the critical need for eye health awareness, preventive care, and accessible treatments for

refractive errors and cataracts, as they constitute the majority of the visual health challenges in the population. Additionally, the presence of conditions like Pterygium and Pseudophakia points to the importance of addressing environmental risks and ensuring postoperative care to maintain visual health.

Discussion:

The findings of this study highlight significant ocular health challenges faced by commercial bus drivers in Kolkata, shedding light on the intricate interplay between their demanding occupational roles and visual well-being. The data paints a vivid picture of a workforce heavily reliant on optimal visual acuity, yet struggling with prevalent ocular issues that pose risks not only to their health but also to public safety. A key observation is the overwhelming prevalence of refractive errors, which affect more than 70% of both eyes among the sample population. This finding underscores the pressing need for widespread and accessible corrective measures, such as spectacles or contact lenses, tailored to the drivers' specific visual needs. Refractive errors like myopia and hyperopia directly impact a driver's ability to perceive road signs, discern hazards, and respond to the dynamic conditions of urban traffic. Without timely correction, these impairments can exacerbate fatigue and strain, further diminishing occupational efficiency and safety. This highlights an urgent need for regular vision screenings, a recommendation that resonates beyond the scope of this study and could benefit professional drivers in other urban settings globally. The study also underscores a significant burden of symptoms linked to ocular health, with blurred vision, tearing, and redness being the most reported complaints. These symptoms, largely indicative of refractive errors, dry eye syndrome, or environmental irritants, reflect the challenges of prolonged exposure to adverse working conditions such as pollution, high glare, and extended hours of focused visual tasks. The reported eye strain and headaches are particularly concerning, as they not only affect performance but also point to systemic issues like inadequate breaks and suboptimal ergonomic practices. Interventions such as occupational training on eye health, coupled with infrastructural changes to reduce exposure to environmental irritants, could significantly alleviate these symptoms. The presence of cataracts and Pterygium in a notable subset of drivers further emphasizes the environmental risks inherent to their profession. Prolonged exposure to ultraviolet radiation, a known risk factor for these conditions, demands preventive strategies such as the mandatory use of UV-blocking sunglasses. Similarly, the relatively small proportion of Pseudophakia cases signals the effectiveness of surgical interventions but also underscores the need for robust postoperative care to ensure long-term benefits. Public health campaigns targeting awareness about cataract surgery and its accessibility could substantially reduce the burden of avoidable blindness among this population. The demographic data provides critical insights into the socio-economic context influencing these health outcomes. The predominance of middle-aged drivers, coupled with low levels of formal education, suggests a workforce with limited access to health resources and preventive care. This scenario calls for systemic interventions, including collaborations between employers, healthcare providers, and policymakers to establish sustainable eye health programs. The high incidence of road traffic accidents among drivers with visual impairments underscores the broader implications of unaddressed ocular health issues, particularly in a densely populated city like Kolkata, where public transport safety is paramount. From a policy perspective, this research advocates for integrating ocular health into occupational safety protocols. Eye screening camps, as conducted in this study, could serve as a model for periodic health assessments, ensuring early detection and management of visual impairments. Additionally, regulatory measures mandating minimum visual standards for driving licenses and enforcing compliance could significantly enhance road safety. Employers should also be encouraged to adopt policies that prioritize eye health, such as providing subsidies for corrective lenses and ensuring adequate rest breaks during long shifts. This study not only illuminates the ocular health challenges faced by bus drivers in Kolkata but also lays the groundwork for targeted interventions that can improve their quality of life and work efficiency. By addressing the underlying causes of visual impairments and fostering a culture of preventive care, stakeholders can ensure a healthier, safer workforce, ultimately benefiting the broader community reliant on public transport systems. These findings provide a compelling case for broader investigations into the intersection of occupational health and vision care, particularly in urban settings with similar demographic and occupational characteristics.

Conclusion:

This study underscores the profound impact of ocular health challenges on the professional lives of commercial bus drivers in Kolkata. With over 70% of the sample population affected by refractive errors, it is evident that visual impairments are a predominant issue within this workforce. These impairments, including myopia and hyperopia, severely limit the drivers' ability to interpret road signs, recognize hazards, and respond promptly to dynamic urban traffic conditions, thereby directly impacting public safety. Additionally, the high prevalence of symptoms such as blurred vision, tearing, redness, and eye strain further highlights the toll that prolonged driving hours and exposure to adverse environmental conditions take on their visual well-being. The findings point to several key areas for intervention. Regular vision screenings, as implemented in this study, are critical for early detection and timely correction of refractive errors. Equally important are initiatives to address environmental stressors, such as providing UV-blocking sunglasses to mitigate the risks of cataracts and Pterygium, which are linked to prolonged exposure to ultraviolet light. Furthermore, addressing workplace ergonomics and reducing exposure to irritants through infrastructural changes can help alleviate symptoms like eye strain and irritation. The study also reveals broader socio-economic and systemic challenges, with a significant proportion of drivers being middle-aged, married, and possessing limited formal education. These factors suggest that many drivers may lack access to adequate healthcare resources and preventive care. Policy measures, such as mandating regular eye health checks for drivers, ensuring compliance with visual standards for driving licenses, and offering subsidies for corrective lenses, are critical for addressing these gaps. Occupational health programs tailored to this demographic are necessary to enhance their well-being and work efficiency. Employers can play a pivotal role by promoting eye health awareness, providing rest breaks to reduce visual fatigue, and implementing supportive workplace policies. The high incidence of road traffic accidents associated with visual impairments further underscores the need for these systemic interventions. This research not only identifies the pressing ocular health challenges faced by bus drivers but also advocates for a comprehensive framework of preventive and corrective measures. By integrating vision care into occupational safety protocols and fostering collaborations among

stakeholders, the findings lay the groundwork for enhancing the overall quality of life for bus drivers. The study serves as a call to action for policymakers and public health authorities to prioritize eye health within urban occupational settings, ultimately ensuring safer and more reliable public transport systems for the community.

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