

## Spectacle Usage Patterns and Associated Socio-Demographic Factors in Middle School Students with Refractive Error

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### ARTICLE CYCLE

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### ABSTRACT

**Introduction:** Uncorrected refractive errors (URE) are a primary cause of avoidable vision loss in school-aged children, often leading to poor academic performance and reduced socio-economic potential. Despite screening efforts, spectacle coverage remains a challenge due to low compliance and various socio-demographic barriers. **Objectives:** The study aimed to estimate the prevalence of spectacle use among middle school children with refractive error and to identify the factors and reasons influencing irregular use. **Methodology:** A study was done in a rural area of Meerut during the time from April 2024 to March 2025, and it was carried out at schools. Using multistage sampling, 350 students from the 6th to 8th standards were selected from government and private schools. Data were analyzed using Epi-info, with Chi-square tests used to determine associations. **Results:** The prevalence of refractive error among the 350 participants was 22.6% (n=79). Among those with refractive error, 59% (n=47) owned spectacles, but only 47% of owners used them regularly, resulting in an irregular usage rate of 53%. Most common reason for irregular use was glasses fogging or getting wet. **Conclusion & Recommendations:** Nearly a quarter of middle school students suffer from refractive errors, yet over half of those with spectacles fail to wear them consistently due to maintenance difficulties and social stigma. Practical issues, specifically lens fogging and dirt remain the most significant physical barriers to regular use across all demographic groups. Public health initiatives should prioritize regular screenings in government schools and awareness programs to reduce peer teasing.

### KEYWORDS

Refractive Error, Spectacle Compliance, Middle School Students, Visual Impairment

### INTRODUCTION

The global burden of visual impairment is dominated by uncorrected refractive errors (URE), which remain the leading cause of avoidable vision loss in school-aged children<sup>1</sup>. While the physiological impact of URE is well-documented, its consequences extend beyond ocular health, significantly hindering a child's academic performance and long-term socio-economic potential<sup>2</sup>. During the middle school years, clear vision is essential as the complexity of educational materials increases, yet millions of children remain undiagnosed or inadequately corrected<sup>3</sup>. Despite various school-based screening initiatives, the success of these programs is often compromised by low spectacle coverage<sup>4</sup>. Current research indicates that even among children who own spectacles, compliance is remarkably low, with global adherence rates often falling below 50%<sup>5</sup>. In the Indian context, regional studies have highlighted a significant gap between the high prevalence of myopia and the actual daily usage of corrective lenses among urban and rural students<sup>6</sup>.

Barriers to regular use includes issues like spectacles fogging up, being lost, or the fear of being teased by peers<sup>7</sup>. Furthermore, socio-demographic determinants such as the type of school a child attends and their family's structural background have been identified as critical influencers of health-seeking behavior<sup>8</sup>.

### Aims and Objectives

- To find out how many middle school kids who have a vision problem are using glasses to correct their sight.
- To find out the possible reasons for irregular use of glasses among the study participants and the factors influencing regularity of spectacle usage among participants wearing spectacles.

### MATERIAL & METHODS

**Study design:** The present study was a cross-sectional study.

**Study period:** The study took place from April 2024 to March 2025. This time frame was used for collecting data, putting it together, and sharing the results.

**Study area:** The study was done in selected schools located in a rural part of Meerut.

**Study population:** The group of people involved in the study were students from the selected schools in rural Meerut. The students were in the 6th to 8th standard.

**Inclusion criteria:**

- Boys and girls from 6th to 8th standard in the selected schools of rural Meerut.
- Students whose parents gave their informed consent.

**Exclusion criteria:**

1. Students who were absent on the day of data collection.
2. Students where parents did not give their consent.

**Sample size estimation:** The sample size was calculated by taking into account a prevalence of refractive error of 17.4%, as reported in a study by Veer Singh et al.(9). A 95% confidence interval and an absolute precision of 5% were also considered.

The sample size was determined using the formula:

$$N = \text{Design Effect} * Z^2_{1-\alpha/2} pq/d^2$$

The final sample size obtained in the study was 350.

**Sampling method:** Multistage sampling method was employed. There are 12 blocks in Meerut district. In the first stage, one block was selected using simple random sampling from the 12 blocks. In the second stage, two government schools and one private school from the selected block were chosen using simple random sampling. Out of the total sample size of 350, 175

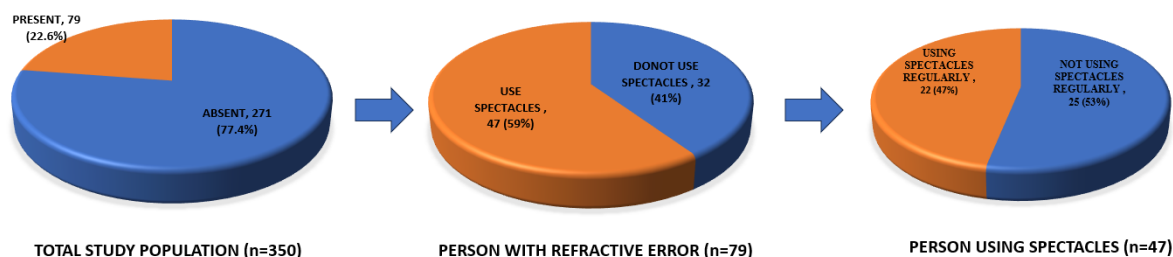
participants were selected from both government and private schools respectively. As the number of participants was less than 175 in one government school, two government schools were selected to achieve the desired sample size. During the simple random sampling in the first two stages, the lottery method was used for the selection of the block and schools. In the third stage, students from sixth to eighth standard were selected proportionately using stratified random sampling.

The study was conducted in the study area after obtaining approval from the Institute Ethics Committee (No./SC-1/2025/2959). The collected data was entered for analysis in Microsoft Excel. Data analysis was performed using Microsoft Excel and Epi-info software. Associations between qualitative variables were analyzed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

**RESULTS**

Out of total 350 middle school children, 22.6% (n = 79) were found to have refractive error. Out of the 79 participants identified with refractive error, 41% (n = 32) were not using spectacles. Out of the 47 participants who reported using spectacles, 53% (n =25) reported irregular use. This indicates that more than half of the spectacle users were not consistently wearing their spectacles for vision correction.

**Figure 1 : Refractive error and spectacles usage**



Among the 25 participants who reported irregular spectacle use, most common reason identified was glasses fogging up or getting wet while the least common

reason was that they often lost or had to search for their spectacles.

**Table 1 : Distribution of reasons for irregular use of glasses among study participants (n=25)**

Reasons for irregular use of glasses	Frequency (n)	Percentage (%)
Wearing glasses is bothersome	10	40.0
Glasses getting dirty	15	60.0
Glasses getting fogged or wet	17	68.0
Losing or searching for glasses	7	28.0
Being teased by others	8	32.0

*\*Multiple responses*

Mathematically the percentage of irregularity of spectacle usage was found higher in male gender , government school students , father’s education upto middle school and mother’s education upto primary and

middle school, students having joint family and students having class III socio-economic status according to modified BG Prasad classification but not statistically(p>0.05).

**Table 2 : Factors influencing regularity of spectacle usage among participants who wear spectacles**

Factors	Spectacles		Total n (%)	Chi square value, df, p value
	Irregular use	Regular use		
Gender				0.4343
Female	9 (47.4)	10 (52.6)	19 (40.4)	1

Male	16 (57.1)	12 (42.9)	28 (59.6)	0.5099
Total	25 (53.2)	22 (46.8)	47 (100)	
<b>Father's education</b>				2.7522
Primary school certificate	1 (20)	4 (80)	5 (10.6)	4
Middle school certificate	2 (66.7)	1 (33.3)	3 (6.4)	0.6001
High school certificate	5 (62.5)	3 (37.5)	8 (17.0)	
Intermediate or diploma	10 (55.6)	8 (44.4)	18 (38.3)	
Graduate and Profession	7 (53.8)	6 (46.2)	13 (27.7)	
Total	25 (53.2)	22 (46.8)	47 (100)	
<b>Mother's education</b>				0.2684
Illiterate	9 (52.9)	8 (47.1)	17 (36.2)	3
Primary and middle school certificate				0.9658
	6 (60)	4 (40)	10 (21.3)	
High school certificate	3 (50)	3 (50)	6(12.8)	
Intermediate or diploma , Graduate and Profession				
	7 (50)	7 (50)	14 (29.8)	
Total	25 (53.2)	22 (46.8)	47 (100)	
<b>Type of school</b>				0.0002
Government	8 (53.3)	7 (46.7)	15 (31.9)	1
Private	17 (53.1)	15 (46.9)	32 (68.1)	0.9887
Total	25 (53.2)	22 (46.8)	47 (100)	
<b>Type of family</b>				0.3402
3-Generation	3 (50)	3 (50)	6 (12.8)	2
Joint	5 (62.5)	3 (37.5)	8 (17.0)	0.8436
Nuclear	17 (51.5)	16 (48.5)	33 (70.2)	
Total	25 (53.2)	22 (46.8)	47 (100)	
<b>Socio-economic status</b>				1.6446
Class I	3 (37.5)	5 (62.5)	8 (17.0)	4
Class II	10 (58.8)	7 (41.2)	17 (36.2)	0.8008
Class III	9 (60)	6 (40)	15 (31.9)	
Class IV	2 (40)	3 (60)	5 (10.6)	
Class V	1 (50)	1 (50)	2 (4.3)	
Total	25 (53.2)	22 (46.8)	47 (100)	

Statistical significance was considered at  $p < 0.05$  with a 95% confidence interval.

## DISCUSSION

Present study identified a refractive error prevalence of 22.6% among middle school children. This is higher than the findings in a study done by Joseph E et al. which reported a prevalence of approximately 3.13% for children aged 10–14 years, though they noted that prevalence significantly increases in urban settings and among private school students(10). Present study results align more closely with a study done by Srivastava et al. in 2024 which found that prevalence in Indian schools is 17.43%, highlighting a significant increased near-work and digital screen exposure(11).

Regarding spectacle usage, present study results show that 59% of children with refractive error owned spectacles and only 47% used them regularly, resulting in a non-compliance rate of 53%. This level of non-compliance is 19.5% reported in a study done by Khandekar et al. in Central India(12). However, it mirrors the poor compliance found in a study done by Gogate et al. in rural Pune, where the compliance rate was only 29.5% (13). This suggests that even when children have access to spectacles, behavioral and environmental factors remain a primary hurdle to consistent vision correction.

The gap between diagnosis and correction likely stems from a lack of school-based screening programs or parental unawareness of the child's vision needs. Irregular use among nearly half of the owners suggests

that while the initial barrier of access was met, there is a lack of consistent reinforcement from teachers and guardians.

According to present study, the most common reasons for irregular use were physical discomforts i.e. glasses fogging up (68%) and getting dirty (60%). These practical issues are major contributors to abandonment. A study done by Mehnaz et al. highlighted that intolerance to glasses and maintenance issues were primary factors leading to non-compliance in the Indian pediatric population(7).

Psychosocial barriers also played a significant role in the present study with 40% of participants being bothered by glasses and 32% citing teasing. This social pressure is a recurring theme in Indian schools. A study done by Gajiwala et al. emphasized that social stigma and the fear of being mocked by peers (such as being called "chashmish") are major determinants that lead children to avoid wearing their spectacles in public(14). Furthermore, the 28% of children in present study who reported losing or searching for glasses is supported by a study done by Dhirar et al., whose systematic review identified personal factors like lost or broken spectacles as a primary reason for non-compliance in over 23% of cases globally(15).

The high frequency of complaints regarding fogging and dirt indicates that children find the physical maintenance of lenses difficult during active school hours.

Furthermore, the fact that 32% are teased suggests that social stigma remains a powerful deterrent, where the fear of peer ridicule outweighs the benefit of clear vision. While males constituted the majority of spectacle wearers (59.6%), there was no significant difference in compliance between genders. This indicates that the psychosocial pressures associated with wearing glasses such as being teased or feeling bothered are experienced equally by both boys and girls in middle school.

Study done by Gogate et al. in Pune found that sex and age were not significant predictors of spectacle compliance in school-aged children(13). Similarly, a study done by Khandekar et al. in Central India reported that while the prevalence of refractive error may differ by gender but the actual usage and compliance rates did not show a statistically significant variation between boys and girls (12).

Usage patterns were nearly identical between school types, with 53.3% of government school students and 53.1% of private school students reporting irregular use. Although private school students often have better initial access to eye care, the day-to-day challenges of maintaining glasses are the same in any school setting. Physical factors such as glasses fogging up or getting dirty occur regardless of the school's infrastructure or socio-economic status.

A study done by Gajiwala et al. noted that private school students often come from families with higher health-seeking behavior and have better access to periodic screenings compared to government school students(14). Additionally, a multistate study done by Saxena et al. confirmed that private school attendance is a major determinant for the correction of refractive errors in India, likely reflecting better socio-economic safety nets for these families(6).

The study found that family type whether nuclear, joint, or 3-generation did not significantly influence compliance. Similarly, paternal and maternal education levels were not significant predictors. More educated parents or those in nuclear families may be more likely to identify the need and purchase the glasses but they may not be able to provide the constant reinforcement needed throughout the school day. Once the child is away from home, their personal comfort and the inconvenience like looking for glasses take precedence over parental instructions.

Socio-economic status also did not show a significant correlation with usage regularity. High-quality or expensive spectacles do not necessarily solve the fundamental issues of lens fogging or the active nature of middle school children. The physical intolerance to wearing the glasses remains a primary hurdle that financial status cannot easily mitigate.

A study done by Srivastava et al. suggests that children in nuclear families often benefit from more direct parental monitoring and fewer competing household priorities, whereas in joint or 3-generational households, the consistency of medical follow-ups is lower(11). A study done by Mehnaz et al., father's higher education was a statistically significant predictor of a child's compliance with vision correction(7).

The lack of statistical significance highlights that the struggle for regular spectacle use is driven more by

practicality and peer perception than by demographic variables. The high frequency of complaints regarding fogging, dirt, and teasing suggests that for this age group, the immediate physical and social costs of wearing glasses often outweigh the benefit of clear vision.

#### **CONCLUSION**

The study identifies a refractive error prevalence of 22.6% among middle schoolers, with 53% of spectacle owners reporting irregular use. Non-compliance is primarily driven by physical factors like lens fogging or dirt and psychosocial barriers such as teasing or feeling bothered by glasses. Ultimately, while socio-demographic factors like gender and parental education showed no significant impact on regularity, the immediate physical and social factors of wearing glasses often outweigh the benefits for these students.

#### **RECOMMENDATION**

Public health initiatives should focus on regular screenings in government schools and awareness programs to reduce social stigma and teasing. Promoting durable, anti-fogging lenses and providing lens care education can directly address the primary physical reasons for non-compliance. Additionally, health education should target multi-generational households to ensure consistent reinforcement of spectacle use for visual health and academic success.

#### **LIMITATION OF THE STUDY**

This cross-sectional study cannot establish causality between factors and spectacle usage. It was conducted in a rural area of Meerut, limiting generalizability to other settings. Self-reported data may have recall bias, and clinical severity or parental attitudes were not assessed.

#### **RELEVANCE OF THE STUDY**

The study highlights low spectacle compliance despite availability among school children. It identifies practical issues and peer stigma as key barriers over socio-demographic factors. Findings support need for school-based awareness and behavior-focused interventions.

#### **AUTHORS CONTRIBUTION**

All authors have contributed equally.

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Nil

#### **CONFLICT OF INTEREST**

There are no conflicts of interest.

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#### **DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS**

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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