

# Prevalence of Myopia and Associated Factors among Elementary School Children in Debre Berhan Town, Ethiopia

Tarikayehu Hailemariam\*

Debre Berhan health science college, Ethiopia

## Abstract

**Background:** Myopia, also known as near-sightedness/short sightedness, is a common type of refractive error. Myopia is already one of the major causes of vision impairment and blindness and is projected to affect almost half of the world's population within 40 years. It affects performance in school and has a negative influence on the future life of the child. This warrants early detection and treatment of refractive errors to prevent permanent disability.

**Purpose:** Present study was planned to determine, the prevalence of myopia and its risk factor among school children.

**Methods:** This was a cross-sectional study done in 7 Public and private elementary schools on 365 school children of 12 – 15 years. The study participants were selected by stratified random sampling. The study parameters were school screening for visual acuity (VA) evaluation and ocular examination at Debre Berhan hospital. Children with visual acuity <6/9 were undergone objective refraction. The various risk factors involved were assessed using a pretested questionnaire. The analysed by using SPSS version 20. Proportions and summary statistics were performed. Bivariable and multivariable logistic regressions were used to see the relationship between variables and to determine the independent predictors.

**Results:** The study was comprised of 41.9 % males and 58.1% females from 7 randomly selected elementary schools with a response rate of 91.5%. The prevalence of myopia was 7.8%. It was more among girls 14 (4.9%) than boys 12 (3.5%). Those participants who enrolled at private school were 2.686 times more likely to develop myopia (AOR=2.682 [95% CI: 1.029, 6.993]). This study also showed those participants from non-myopic families 99% less likely to develop myopia (AOR=0.101 [95%CI: 0.020, 0.499])

**Conclusions:** The prevalence of myopia among Debreberhan Town Elementary school children was low 7.8%. Being from a non-myopic family and working distance of >30cm were positively associated with myopia. Whereas learning at private school was negatively associated with myopia.

**Keywords:** Myopia, Elementary school, Debreberhan Town, Ethiopia

## Background

Myopia, also known as short-sightedness, is a common type of refractive error. In which close objects are seen clearly, but objects farther away appear blurred [1-5].

Myopia can have a potential negative impact on career choice, ocular health, and sometimes self-esteem [6, 7]. School-age children constitute a particularly vulnerable group, where uncorrected myopia may have a dramatic impact on learning capability and education [3]. These treatable conditions can impact a child's life [8-14].

Myopia firstly occurs in school-age children, and typically progresses until about the age of 21, because the eye continues to grow during childhood [4]. However, myopia may also develop in adults due to visual stress or health conditions such as diabetes [5].

Myopia can be treated by most primary care optometrists, but the treatment of some patients with myopia may require a referral [12, 1]. Managements of Myopia can be:-Eyeglasses are the simplest and safest way to correct myopia [1, 4]. Contact Lenses work by becoming the first refractive surface for light rays entering the eye, causing more precise refraction or focus [13-15]. Refractive Surgery aims to permanently change the shape of the cornea which will improve refractive vision. Surgery can decrease or eliminate dependency on wearing eyeglasses and contact lenses [15, 11, 14].

Recent kinds of literature explain that myopia is not a simple

refractive error and it became a leading cause of blindness [3, 10, 16, 17, 18]. Studies have shown that myopia progresses faster when children present with myopia at a younger age [9].

The prevalence of myopia is increasing globally at an alarming rate, with implications for planning services, including managing and preventing myopia-related ocular complications [10]. But it receives insufficient attention from a public health perspective [11]. Not only because of its high prevalence, but also because it can contribute to less productivity and poor quality of life [12]. It affects more than 25 to 35% of European descent populations and up to 50% or more of Asian descent populations [11, 21].

Myopia affects about 80% of school-aged children living in China and is one of the major causes of visual impairment worldwide. Studies

**\*Corresponding author:** Tarikayehu Haile Mariam (BSC, MPH) Debre Berhan health science college, Ethiopia, Tel: +251 913760781; E-mail: Tarikua1223@gmail.com

**Received:** 06-Jul-2022, Manuscript No: omoa-22-68725, **Editor assigned:** 08-Jul-2022, PreQC No: omoa-22-68725 (PQ), **Reviewed:** 22-Jul-2022, QC No: omoa-22-68725, **Revised:** 27-Jul-2022, Manuscript No: omoa-22-68725 (R), **Published:** 31-Jul-2022, DOI: 10.4172/2476-2075.1000169

**Citation:** Hailemariam T (2022) Prevalence of Myopia and Associated Factors among Elementary School Children in Debre Berhan Town, Ethiopia. *Optom Open Access* 7: 169.

**Copyright:** © 2022 Hailemariam T. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

show that by 2050 the prevalence will be  $\geq 50\%$  in 57% of the countries if current trends continue.

Countries in which the prevalence of myopia has been estimated and measured as low in the past (e.g. India) will have major increases by 2050. It is estimated that at least one-third of the world's 72 million children who are not in school have a disability, which includes those with vision impairment [22, 16].

According to Global Burden of Disease estimates, uncorrected distance refractive error is the second largest cause of blindness and the leading cause of moderate and severe vision impairment (53%) [13]. In Ethiopia it was the second leading cause of low vision by 2005-2006. The first one was cataract (42.3%), then refractive error (33.4%).

Regarding myopia risk factors genetics and environment are in the front line. But in many papers, however, it was reported that today many people are becoming myopic even though their parents or grandparents were not [15]. Evidence is emerging that spending more time outdoors can protect against the onset of myopia. It was reported that, when children spend sufficient time outdoors (more than two hours/day), the risk of myopia was reduced, even when they had two myopic parents and continued to perform near work [16].

Many authors believe that reading, writing, and using computer/video/mobile games lead to a higher prevalence of myopia. Some studies also show the relation of the duration of watching television (TV), distance from which TV was watched, and myopia [17]. And shows how good Creating awareness to children, parents, and particularly, the teachers who play an important role in shaping the child's career and behaviour to prevent it [15]. However, there have also been some publications that have not found such association. In the majority of these studies, no dependency between watching television and myopia has been described [18].

Promoting and improving the eye health of children will contribute to Goal 4 of the Sustainable Development Goals, to "ensure inclusive and equitable quality education for all and promote lifelong learning [14]. But 7.8 % of 26 elementary school students of Debrebirhan were myopic. So this study will be useful for enhancing the government as well all other stakeholders' commitment to improving the situation [17]. And for researchers, this finding can increase their motivation of doing further study.

## Methods

A descriptive, cross-sectional study was performed on elementary school children in Debre Berhan Town Ethiopia. This is situated 130 km from Addis Ababa (capital city of Ethiopia) to the North direction. The population of Debre Berhan town recently is 94, 829 and it is well known for its historic and cold climate. The Town has got nine kebele (administrative units). There are 28 Elementary schools in Debrebirhan Town. Among them 12 are private and 16 schools are public. This year's total numbers of students are 9909 according to the Debrebirhan Town Education office report.

There is a referral hospital that provides different specialties. The ophthalmic unit has a different staff like ophthalmologists, optometrists, and ophthalmic nurses. There is one private ophthalmic clinic. The sample size was calculated using the single population proportion formula by assuming 95% confidence interval (CI), marginal error 5%, and by considering 31.6% proportion from the previous study [19] 10% contingency to account for attrition is also considered by using a single population proportion formula the sample size was determined assuming a confidence level of 95%,

Where:

- $n$  = sample size = proportion, taking 31.60 %
- $Z_{\alpha/2}$  = critical value at 95% CI of certainty (1.96)
- $d$  = marginal error of 0.05.
- $n = 332$

By adding 10% non-response rate finally, the estimated sample size was: =365

A stratified random sampling technique was used during the sampling process. A list of schools was obtained from the Debre Birhan town educational office. To ensure representativeness, a sample was taken from about seven of the total elementary schools. First, by using stratified random sampling technique 7 schools out of 21 elementary schools were selected. Four from government and three from private schools with proportional allocation were selected the stratifying variable was the ownership of schools (private government). Finally, the participants were selected using a simple random sampling method.

Ethical clearance and permission were obtained from the Ethical review committee of Debre Birhan University, College of Medicine and Health Science, and the respective schools respectively before the data collection process was started. Informed written consent and assent were obtained from the parents and children, respectively. Before the examination, adequate information about the study had been provided to them. They were also well-informed about the free eye examination, which was offered at Debre Birhan referral hospital for participants who have had reduced sight with school screening. And also the procedure and benefits of the study were to encourage the provision of honest and accurate responses. The participants were informed that participation would be voluntary and the confidentiality and privacy of their information to be secured.

The costs examination and ordered spectacles were covered by HDPO/ Help for Persons with Disability for those myopic participants who couldn't afford it.

A structured questionnaire was used to collect data regarding sociodemographic, individual characteristics, environmental, growth, and developmental information. School screening and ocular examination were used to collect data regarding the prevalence of myopia.

VA was measured by a trained health professional with the Snellen E-chart at their school using the classroom after adjusting the room illumination with bright light.

Data quality was assured before; during and after data collection. Before data collection, four trained health professionals /1BSC, 3diploma nurses/ were participated in data collection. And close follow-up and supervision were carried out before, during, and after data collection. During data collection first, the data collectors collect data from respondents using interviewer-administered questioners then after they finish the questioner participants went to V/A measurement. V/A measurement were carried out at each specific school by using the Snellen acuity test chart as school screening. Visual acuity less than 6/9 was taken as a cut-off point. Then students with subnormal vision were examined at Debrebirhan referral hospital. Ocular examination and pinhole were performed for any visual acuity improvement. And then non-cycloplegic objective refraction was carried out by a senior experienced optometrist to determine myopia. Myopia was defined as (SER = sphere + 1/2 cylinder) of  $-0.50$  D or more in either eye.

Data were analysed by using SPSS version 20. Proportions and summary statistics were performed. Bivariable and multivariable logistic regressions were used to determine the associated factors. The variables that were found with  $p < 0.2$  at bivariable logistic regression were entered to multivariable analysis and those variables with  $p$ -value  $< 0.05$  were considered statistically significant.

## Results

### Sociodemographic Characteristics

A total of 334 study participants were involved in this study with a response rate of 91% all of them were screened at their school. Of those 36 students, the V/A measurement result was  $< 6/9$ . Out of those students, 26 were myopic. [7, 20, 21]. The overall mean age of the participants was 13.6, range 12–15 years. The proportion of children was from the government school 238 (71%) and from private school 96 (28%). Regarding their sex 140 (41.9 %) were boys and 194(58.1%) were girls. Most of the study participants 318 (95.2%) were Orthodox Christian. The greater proportion of the study participants' parental educational status was found to be 96 (28.7%) elementary. Participants those both parents alive were 287 (85.9%) and both parents not alive were 4 (1.2%) as shown [Table 1].

**Table 1:** Sociodemographic characteristics of the study participants in Debre Birhan Town, North Shoa Ethiopia, and June 2019.

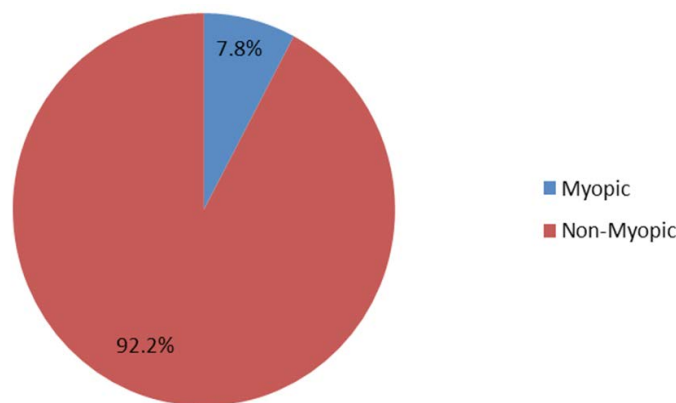
Variables	Characteristics	Frequency	Percent
<b>Sex</b>	Male	140	41.9
	Female	194	58.1
<b>School type</b>	Government	238	71.3
	Private	96	28.7
<b>Maternal education</b>	Cannot read and write	86	25.7
	Can read and write	16	4.8
	Elementary	96	28.7
	Secondary	70	21
<b>Maternal age</b>	Certificate and above	66	19.8
	15-25	76	22.8
	26-35	178	53.3
	36-45	67	20.1
<b>Religion</b>	>45	13	3.9
	Orthodox	318	95.2
	Muslim	8	2.4
	Protestant	8	2.4
<b>Father education</b>	can read and write	46	13.8
	Can read and write	16	4.8
	Elementary	104	31.1
	Secondary	74	22.2
	colleague /university	93	27.8
<b>House hold head</b>	Father	164	49.1
	Mother	93	27.8
	Both	51	15.3
	other family member	26	7.8
	house wife	168	50.3
<b>Maternal job</b>	Student	4	1.2
	Governmental	68	20.4
	Private	82	20.4
	NGO	12	3.6
<b>Students parent</b>	Both are alive	287	85
	Father only	35	10.5
	mother only	8	2.4
	both are not alive	4	1.2
	Total	334	100

### Prevalence of Myopia

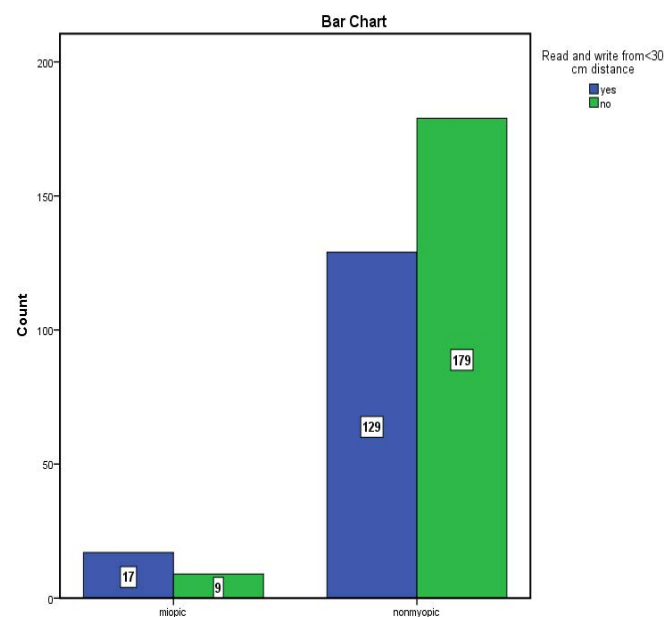
From 334 participants of this study, 26 (7.8%) were myopic more than half 14 (53.8%) were from private schools. It was slightly more among girls 14 (4.9%) than boys 12 (3.5%). Regarding their age distribution, 8(30%) of myopic students' age was 12, 7 (26%) of the age was 13 and 14 only 4 (15%) students age was 15 [Figure 1].

### Individual Characteristics

Most of the study participants 321 (96.15%) had no parental myopia. Only 13(3.9%) had a family history of myopia. The majority of the study participants spent less time outside the home 231(69.20%). It was observed that 205(62%) participants had a trend of playing mobile games. Most participants 198 (59.3%) reported that they spent 28-35 hours per week near work, whereas 49(14.7%) of participants  $> 42$  hours per week spent for reading and/or writing. Very few 5(1.5%) participants spent more time watching TV. More than half of participants 188 (56.3%) reading/writing distance was  $> 30$  cm, 146 (43.75%) of participants used  $< 30$  distance to read [Figure 2].



**Figure 1:** Proportion of myopia among the study participants in Debre Berhan town, north Shoa, Ethiopia, June 2019.



**Figure 2:** Proportion of myopia among of elementary school students in relation to their habit of using a working distance  $< 30$  cm in Debre BirhanTown, North Shoa Ethiopia, June 2019.

### Environment

Most participants 308(91.7 %) were lived in a ground house. Only 26(7.7%) participants lived ground plus houses. For the majority of participants 225(67%) the distance they used to watch TV in their home was >2 meters. Seven students had no TV in their homes. Most participants' houses 303(90.25%) were well illuminated. Of 334 participants 248 participants' season of birth was winter, 86(25.6%) were born in summer.

### Growth and Development

The study participants who had appropriate gestational age/ GA were 119(35.45%). And 126(37.5%) participants didn't know their GA. All participants had no birth defect. The majority of participants 212(63.1%) birth weight was unknown. But 99(29.6%) participants had appropriate weight. Only 23(6.8%) participants had not appropriate birth weight.

### Psychological and Medical Condition

Most participants 256 (76.2%) had good self-stem; only 28(8.3%) participants had low self-stem. The majority of participants 217 (64.6) had not experienced that situations causing stress, and 117(34.8%) had experienced that situations causing stress.

### Bivariate Analysis

Bivariate analysis was used to determine possible risk factors for myopia. In addition, multivariate logistic regression models were used to adjust for possible confounding factors. Bivariate analysis revealed that type of school ,parental myopia ,working distance, time spent for near work ,and time spent outside were all related to prevalence of myopia .Which were, COR= 3.215 [95%CI: 1.428, 7.238 ] (COR=0.382[95% CI:0 .165, 0 .883]), (COR=0 .382[95% CI: 0 .165, 0 .883]), (COR=0 .382[95% CI: 0 .165, 0 .883])

### Multivariate Logistic Regression

Variables whose P values were less than 0.2 were entered into multivariate logistic regression analysis. Among those variables also disclosed that that type of school, parental myopia, working distance, time spent near work all of these risk factors were significantly associated with myopia [Table 2].

But time spent outside is no longer associated. Based on this study result, hours spent per week to near works /reading and writing was significantly associated with myopia Those participants who spent 24-36 hours per week were 99.8% less likely to develop myopia than those who spent 42 hours per week (AOR=0.213[95%CI:0.115,0 .397]). Those participants who enrolled at private school were 2.686 times more likely to develop myopia (AOR=2.682 [95% CI: 1.029, 6.993]). Those study participants who were using a working distance of >30 cm 99.7% less likely to develop myopia as compared to those who used a

working distance of <30 cm (AOR=0.286 [95%CI: 0.107, 0.767]). This study also showed those participants from non-myopic families 99.9% less likely to develop myopia (AOR=0.101 [95%CI: 0.020, 0.499])

There was no relationship between watching television and myopia. And also duration of watching TV, distance from which TV was watched, duration of computer/video/ mobile games, had no statistically significant association to the prevalence of myopia.

There was no significant statistical difference in the prevalence of myopia between boys and girls p-value 0.649. Age is also among the variables that have shown a strong association with many previous studies. But not for this study their p-value was 0.886. 74% of participants' season of birth was winter and it had no statistically significant association to the prevalence of myopia value.

Other variables like birth weight, gestational age at birth, and maternal age at birth were not shown significant association. This study finding tries to answer the question whether the association between protein intake and myopia and carbohydrate intake. None of the nutrients, however, was associated with myopia.

### Discussion

The prevalence of myopia in this study was 26 (7.8 %) (95% CI: 4.8, 10.8). This was similar to a study conducted in India by 2015 which was 7.48% and an urban population in New Delhi also reported a prevalence of 7.4% of myopia [22, 23]. However, the prevalence of myopia in this study was higher than the study conducted in Malawi which was 1.7% among the same age range by 2007 [23]. This might be due to variation in, the year of study. And the case definition they used was different from this study which was students with V/A 6/12 eligible for objective refraction whereas for this study the cutoff point was 6/9. The prevalence of myopia (7.8%) from this study was also higher than the 2014 prevalence of myopia (5.475%) which was conducted in DebreMarkose almost with a similar sample size [24]. The difference might be again because of the variation in a year of study. In Contrast, this study's prevalence was lesser than the prevalence of Myopia was observed in Gonder town among elementary school children by 2012; myopia was 31.6% [19].

In this study school type was significantly associated with myopia. Those study participants who enrolled at private schools were 2.686times prone to myopia as compared to participants who enrolled at government schools. A similar finding was reported in Gonder, study participants who were in private school were 2.88 times at risk of developing myopia as compared to those who attend government schools. Prevalence of myopia was higher in private schools compared to government schools from other studies also reported, from Delhi north India and in Hyderabad city [20, 3]. This might be private schools students spend more time in the classroom because private schools are not as restricted in their program development or curricula, students were subjected to excessive near tasks. Not only are this most of the

Table 2: Factors associated with myopia among elementary school students, Debere berhan town, north shoa, Ethiopia, June 2019.

Variables	Absolute NO.	Categories	COR ( 95% C.I)	AOR ( 95% C.I)
Type of school	96	Private	3.215 (1.428, 7.238)	2.682 (1.029, 6.993)
	238	Government	1	1
Hours spent per week to near works /Read and write	198	28-36hr	0.213 (0.121, 0.375)	0.213 (0.115,0 .397)
	49	>42hr	1	1
Working distance less <30cm	188	No	0.382 (0.165,0.883)	0.286 (0.107,0.767)
	146	Yes	1	1
Being from non-myopic family	221	No	0.11 (0.34,0.373)	0.101 (0.020,0.499)
	13	Yes	1	1

students from private schools from wealthier families. So they spent their extra time again in near works like playing computer or mobile game, watching movies. Such activities expose their eye for the need for accommodation for excessive hours [15]. Whereas students from a government school, spent a half-day in the school plus most of them have responsibilities like helping their parents on household works or outside the home. They have no restriction from parents to be at home they play without fear of dirtiness and bad behavior adaptation. This all matters to the student's eye exposure to excessive accommodation and pupillary dilation that leads to retinal image defocus axial length elongations, and development of myopia [2, 19, 18]. And also the possibilities of sunlight exposure during outside activities help to prevent axial length elongation and development of myopia even for students with parental myopia and excessive near work history [24].

On the contrary, the prevalence of myopia has no association with school type in some other studies. For instance in Nepal which study objective was to evaluate ocular morbidity among both types of schools showed that a significant number of children of school-going age have myopia with no significant difference in the prevalence in the students from government and private schools [22]. A significant number of children of school-going age have myopia with no significant difference in the prevalence in the students from government and private schools [3]. Type of school (private vs. public) was not associated with myopia ( $p = 0.650$ ) in Niger among school children [13]. Studies are showing a significant association between myopia and school type.

The study participants who had no history of parental myopia were 89.9% protected as compared to those from myopic parents. This is in line with the study conducted in Gonder which was 8 times more likely to develop myopia as compared to those who had no family history of myopia [AOR]=8.08 [95% CI: 4.30, 15.16]) [2].

This study also revealed that spending more time on outdoor activities was positively associated with myopia. P-value, 0.031. But after multivariate analysis, there was no longer association. Outdoor activities were found to have a substantial positive effect on the prevention of myopia or the reduction of the progression of myopia as numerous papers showed [15].

The other finding of this study was the significant association between myopia and reading and or writing from within a short distance. Those study participants who use a reading distance of >30 cm were 71.4% times less more protected as compared to those who used a reading distance of <30 cm this is in line with the findings from Gonder among high school students which were working distance of <33 cm were 3 times more likely to develop myopia as compared to those who used a working distance of >60 cm [2]. This is also supported by the study conducted in Taiwan which revealed that nearer reading distance was associated with myopia and longer axial length [23].

The study participants who spent less time /28-36 hours per week/ 78.7% more protected as compared to those who spent more time />42 hours. This is in line with numerous previous studies that reported that schoolchildren who spent more time near work were more likely to have myopia than those who spent less time near work [16, 24, 2].

Consistent with previous studies this study revealed that the prevalence of myopia was slightly more among girls 14 (4.9%) than boys 12 (3.5%) were boys. For instance, one study revealed that the prevalence was in females (60.7%) and less (39.3%) in males [20]. The other studies also showed that among the 35 myopic students, 20 are females and 15 are males [11].

In contrast, this finding is inconsistent with a study from In Nigeria also shows the absence of association of sex and myopia. There was no significant difference in myopia prevalence between male and female children  $p = 0.89$ ) [1].

According to this study, there is no association between Watching TV, its duration, and the distance from which TV was watched. But watching TV and its duration association was supported by some studies [10]. This study finding was similar to studies done in a Polish population to evaluate the role of watching television in the development of myopia [18].

## Conclusion

The prevalence of myopia among Debrebirhan Town Elementary school children was low 7.8%. Being from a myopic family and using working distance >30cm were positively associated with myopia. Whereas learning at private school was negatively associated with myopia.

## Recommendation

The Family-School Partnerships Framework should support parent engagement in their children's lifestyle modification.

## Declarations

### Ethics Approval and Consent to Participate

Ethical approval was obtained from the Debre Berhan University Research Ethics Review Committee and informed oral consent was taken from every study participants

### Consent for Publication

Not applicable

### Availability of Data and Materials

Data are available from authors on reasonable requests.

### Competing Interests

The authors declare that they have no competing interests. Data are available from authors on reasonable requests.

### Funding

No funding

### Authors' Contributions

TH made substantial contributions to the conception and design of the protocol; TH performed data collection and analysis and interpretation of the findings and wrote the paper; TH has been involved in guiding data collection analysis and report writing. TH drafted the manuscript; proofread. TH finalizes the manuscript; TH has given final approval of the version to be published; and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work which is appropriately investigated and resolved.

### Acknowledgments

I gratefully acknowledge the financial support for the costs of examination and spectacles provided by the Help for Persons with Disabilities Organization/HPDO. My gratitude also goes to Mr. Adis Wondifraw (MSC, Senior Clinical Optometrist) for his unreserved support and encouragement.

## References

1. Vision A, Health E Prevalence and risk factors for myopia among school children in Aba, Nigeria. *African Vis. Eye Health*. 76:1-5.
2. Optometry C (2017) Prevalence and associated factors of myopia among high school students in Gondar town, northwest Ethiopia, 2016. *Clin Optom*. 9:11–18.
3. Krishnakumari V, Suryaprabha ML (2020) Socio Demographic Profile of High School Children with Myopia :A Comparative Study between Government and Private Schools in Hyderabad City. *Clin Optom*. 15:34–39.
4. Jacobsen N, Jensen H, Lund-andersen H, Goldschmidt E (2020) Is poor glycaemic control in diabetic patients a risk factor of myopia ? *Acta ophthalmologica*. 86:510-514.
5. Wu X, Gao G, Jin J, Hua W, Tao L, Xu S, et al. (2016) Housing type and myopia : the mediating role of parental myopia. *BMC Ophthalmol*.16:1–7.
6. Wu P, Huang H, Yu H (2016) Epidemiology of Myopia. *Clin Optom*. 5:386–393.
7. Holden BA, Fricke TR, Wilson DA, Jong M (2016) Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050. *Ophthalmology* 123:1036-1042.
8. Czepita D (2014) Myopia : incidence, pathogenesis, management and new possibilities of treatment.
9. Holden BA, Wilson DA, Jong M, Sankaridurg P, Fricke TR, et al. (2015) Myopia : a growing global problem with sight-threatening complications. *Community eye health* 28:35-36.
10. Kannan U, Rajendiran A, Yeraballi D, Shanmugavel K, John NA, et al. (2016) Refractive error and associated risk factors in 6-12 years schoolchildren. *Natl J Physiol Pharm Pharmacol*, 6:554–558.
11. Czepita M, Kuprjanowicz L, Safranow K, Mojsa A, Majdanik E, et al. (2016) The role of reading , writing using a computer , or watching television in the development of myopia. *Ophthal J*. 1:53-57.
12. Yared AW, Belaynew WT, Destaye S, Ayanaw T, Zelalem E, et al. (2012) Prevalence of Refractive Errors Among School Children in Gondar Town, Northwest Ethiopia. *Middle East Afr. J. Ophthalmol*. 19:372–376.
13. Ip JM, Rose KA, Morgan IG, Burlutsky G, Mitchell P, et al. (2017) Myopia and the Urban Environment : Findings in a Sample of 12-Year-Old Australian School Children. *Invest Ophthalmol Vis Sci*. 49: 3858-3863.
14. Berhane Y, Worku A, Bejiga A, Adamu L, Alemayehu W, et al. (2008) Prevalence and causes of blindness and Low Vision in Ethiopia. *Ethiop J Health Dev*. 21: 204-210.
15. Rao CMS, Satyasrinivas V, Muralikrishna V, Ashok V, Singh RP, et al. (2017) A Clinical Study of Prevalence of Myopia in School Going Children in Kakinada City. *Ethiop J Health Dev*. 5:176–181.
16. Hospital MC (2008) Magnitude and pattern of significant refractive errors in primary school children of Lilongwe, an urban district in Malawi. *Middle East Afr. J. Ophthalmol*.12:39–41.
17. Hashemi H, Yekta A, Nabovati P, Khoshhal F, Riazi A et al. (2018) The prevalence of refractive errors in 5-15 year-old population of two underserved rural areas of Iran. *J Curr Ophthalmol*. 30: 250–254.
18. Saxena R, Vashist P, Tandon R, Pandey RM, Bhardawaj A, et al. (2015) Prevalence of Myopia and Its Risk Factors in Urban School Children in Delhi : The North India Myopia Study ( NIM Study ). *PloS one* 10: 1–11.
19. Theophanous C, Modjtahedi BS, Batech M, Marlin DS, Luong TQ, et al. (2018) Myopia prevalence and risk factors in children. *Clin Ophthalmol*.12: 1581–1587.
20. Koirala S, Adhikary S, Sharma AK (2003) Ocular morbidity in schoolchildren in Kathmandu. *Br J Ophthalmol*. 87: 531–534.
21. Lee Y, Lo C, Sheu S, Lin JL (2019) What Factors are Associated with Myopia in Young Adults ? A Survey Study in Taiwan Military Conscripts. *Invest Ophthalmol Vis Sci*. 54:1026–1033.
22. Rudnicka AR, Kapetanakis VV, Wathern AK, Logan NS, Gilmartin B, et al. (2016) Global variations and time trends in the prevalence of childhood myopia, a systematic review and quantitative meta-analysis : implications for aetiology and early prevention. *Br J Ophthalmol*. 100: 882–890.
23. Y AA, H BW, S AA, M SF, M SA, et al. (2014) The Prevalence and Risk Factors of Myopia among Medical Students of King Saud University, Riyadh City, Saudi Arabia. 2013-2014. *Br J Ophthalmol*. 2:42–54.
24. Rajendran K, Haneef M, Chandrabhanu K, Muhammed M, Pillai RT, et al. (2014) A Prevalence Study on Myopia among School Going Children in a Rural Area of South India. *Br J Ophthalmol*. 25:374–380.