Addis Ababa University

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# PREVALENCE AND ASSOCIATED FACTORS OF VISUAL IMPAIRMENT AMONG PRESCHOOL CHILDREN IN SELECTED KINDERGARTEN SCHOOLS IN ADDIS ABEBA, ETHIOPIA. CROSS-SECTIONAL STUDY.

A RESEARCH THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, PEDIATRICS AND CHILD HEALTH DEPARTMENT IN PARTIAL FULFILLMENT OFTHE REQUIREMENT FOR THE SPECIALITY CERTIFICATE PROGRAM IN PEDIATRICS AND CHILD HEALTH.


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**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES**
**SCHOOL OF MEDICINE**

**DEPARTMENT OF PEDIATRICS AND CHILD HEALTH**

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**March, 2024**

**Addis Ababa, Ethiopia**

# Acknowledgment

I would like to express my deepest gratitude to Addis Ababa University College of Health Sciences, Department of Pediatrics and Child Health for allocating the budget and giving me the chance to do this research.

I would like to express my respect and gratitude to my advisor Dr. Hanna Gebre, for her incredible support throughout the development of this proposal and her ever readiness to help me until the end of the study.

And I would also like to thank Dr Girum W. Gebreal for his invaluable comments and inputs on the study.

# Table of Contents

Acknowledgment ........ 2

Table of Contents ........ 3

Acronym ........ 5

List of Tables ........ 6

List of Figures ........ 7

Abstract ........ 8

1.INTRODUCTION ........ 9

1.1. Background of the study ........ 9

1.2 Statement of the Problem ........ 10

1.3 Significance of the Study ........ 12

2.Literature Review ........ 14

2.1 Prevalence ........ 14

2.2 Associated factors ........ 15

2.3.Conceptual Framework & Study variables ........ 18

3. Objectives ........ 19

3.1 General Objective ........ 19

3.2 Specific Objectives ........ 19

4 METHODS AND MATERIALS ........ 20

4.1 Study area ........ 20

4.2 Study period ........ 20

4.3 Study design ........ 20

4.4 Source Population ........ 20

4.5 Study population ........ 20

4.6 Sampling method ........ 21

4.7 Sampling Procedure ........ 21

4.8 Selection criteria ........ 22

4.8.1. Inclusion criteria ........ 22

4.8.2Exclusion criteria ........ 23
4.9 Study Variable ........ 23
4.9.1 Dependent Variable ........ 23
4.9.2 Independent Variable ........ 23
4.10 Operational Definition ........ 23
4.11 Data collection tool and measurement ........ 24
4.12 Data Processing and Analysis ........ 25
4.13 Data Quality Assurance ........ 25
4.14. Ethical Consideration ........ 26
4.15. Dissemination of Findings ........ 26
5. Results ........ 27
5.1 Socio-demographic Characteristics of Study Participants ........ 27
5.2 Child birth history and Previous Medical history ........ 28
5.3 Maternal characteristics ........ 29
5.4 Electronic Device exposure ........ 30
5.5. Family history ........ 31
5.5. Physical Examination Findings ........ 31
5.6 Prevalence of Visual Impairment ........ 33
**5.6.1 Visual acuity OS (Left eye)** ........ 33
**5.6.2. Visual acuity OD (Right eye)** ........ 34
**5.7 Factors Associated with Visual Impairment** ........ 37
**5.8 Correlation of visual Impairment with other Numeric variables** ........ 38
6. Discussion ........ 39
7. Strength and Limitations ........ 42
8. Conclusion and Recommendation ........ 43
Conclusion ........ 43
Recommendation ........ 43
9. Reference ........ 44
Annex ........ 46
Questionnaire Tool ........ 48
Questionnaire ........ 49

# Acronym

**AAP** ………………… American Academy of Pediatrics

**BCVA**- ……………………………….Best-corrected visual acuity

**BL**- …………………………………..Blindness

**LMICs**- ………………………………..Low and middle-income countries

**OD** ………………………………….Oculus dexter (the right eye)
**OS** ………………………………….Oculus sinister (the left eye)

**PI**- ……………………………….…..Principal Investigator

**PVA**-………………………………….Presenting visual acuity

**SPSS**- ………………………..……….Statistical Package for Social Sciences

**SUI-** ………………………………….Severe visual impairment

**UCVA**- ………………………………..Uncorrected visual acuity

**U.S-…**……………………………….…United States

**VI-** …………………………………….. Visual impairment

**WHO-** ……………………………….World health organization

# List of Tables

Table 1: Socio-Demographic Characteristics of Study participants ........................................................ 28
Table 2: Bivariate and Multivariable Logistic Regression Analysis of factors associated with visual impairment among pre-school children in selected kindergartens found in Addis Ababa. ....................... 37
Table 3: Correlation of Visual Impairment with Socio-demographic Characteristics .............................. 38
Table 4: Correlation of Visual Impairment with Behavioral Characteristics ............................................ 38

# List of Figures

Figure 1 :- In Ethiopian children b/n the age of 0-18 years There was a relatively higher prevalence of visual impairment in its study area in 2017 but decreased in 2018 and also 2020.(1) .............................. 15
Figure 2 Anatomical site (A) and (B) Etiologies of different age groups. Which was done from students of 383 students attending nine schools for the blind in Northwest Ethiopia were examined and causes were assigned using the standard WHO record form.(2)........................................................................ 17
Figure 3 Conceptual framework............................................................................................... 18
Figure 4 Flow diagram of Sampling Procedure,Addis Ababa Preschools update on 2014. Ministry of Education (25) ........................................................................................................................ 22
**Figure 5 Age distribution in the dataset**.................................................................................. 27
Figure 6: Maternal Alcohol consumption during pregnancy .................................................................... 30
Figure 7 Behavioral characteristics of Pre-school children; A.Duration of Television exposure, B. Distance from TV ........................................................................................................................ 30
*Figure 8. Distribution of Penlight physical examination* ........................................................................ 32
Figure 9: Physical Eye Examination Finding of preschool-children in selected Kindergartens in Addis Ababa........................................................................................................................................ 33
Figure 10: Distribution of Monocular visual acuity (OS)......................................................................... 34
Figure 11. Distribution of Monocular Visual Acuity (OD) ....................................................................... 35
Figure 12. Prevalence of Visual Impairment in Pre-school children in Addis Ababa, Ethiopia ................ 36
Figure 13 **: The distribution of visual impairment by age is depicted as follows** ............................... 36

# Abstract

**Background**: A child's vision provides valuable information about the surrounding world. The eye problem in Ethiopia is among the major public health challenges. The prevalence of low vision and blindness in Ethiopia is 3.7% and 1.6% respectively. The America Academy of Pediatrics in its Recommendations for Preventive Pediatrics Health Care recommends for Ophthalmological evaluation to be started from the age of 3 years up to 6 years. With much visual impairment being due to either preventable or treatable causes, early detection or correction of visual problems at an early age is important.

**Objectives:** To determine the prevalence and the associated factors of visual impairment among preschool-age children in selected Kindergarten schools in Addis Ababa, Ethiopia from September 29, 2023- October 29, 2023.

**Methods:** Cross-Sectional Study was conducted at selected preschools located in Addis Ababa. The total sample size was estimated to be 238. A multistage sampling technique was used to select study participants. Data was collected by trained data collectors using a structured questionnaire and physical examination. Data collected was checked for completeness, cleaned and entered into SPSS version 25 for analysis. Descriptive Statistics was computed in frequency tables. Correlation analysis and Binary Logistic regression was done to assess factors affecting visual impairment. P value < 0.05 is taken as statistically significant.

**Result**: Among the 229 pre-school children who participated in this study 12 of them had visual impairment making the prevalence of visual impairment in the selected kindergartens to be 5.28%. Maternal alcohol use during pregnancy (**AOR=8.529, 95% CI (1.51-48.02)**) and abnormal pen light evaluation **(AOR=18.932, 95% CI (3.85-92.89))** were found to be significantly associated with visual impairment.

**Conclusion**: This study has shown that visual impairment is prevalent in pre-school children. It has shown that screening at this age as per the recommendations of the AAP can be beneficial with many of the visual impairments being due to either preventable or treatable causes,

**Key terms**: Visual impairment, Preschool children, childhood blindness

# 1.INTRODUCTION

## 1.1. Background of the study

The visual system is part of the important sensory system of our body it is the primary means of integration between a child and their surrounding environment. Therefore, any defect in the anatomy or physiology of the visual system will lead to a visual impairment such as low vision and blindness.(1) Underlying the importance of the normal functioning of this particular system for the proper growth and development of a given child.

Visual acuity is a quantification of the finest detail of a sight. It gives a threshold. The acuity of vision is determined by the smallest retinal image, which can be appreciated. A child's vision provides valuable information about the surrounding world which makes it vital in protecting a child from a dangerous or harmful environment.(2)

Children born blind or who become blind and survive have a lifetime of blindness ahead of them, which has an associated emotional, social and economic cost to the child and society as a whole. Many of the conditions causing blindness in children for example premature birth or measles are also known causes of child mortality, showing how controlling blindness in children also increases their chances of survival in this world. (3)

According to the WHO low vision is defined as a visual acuity of less than 6/18, but equal to or better than 3/60. On the other hand, blindness refers to visual acuity of less than 3/60 or corresponding visual field loss in the better eye with the best possible correction. It can be classified as mild, moderate, severe, and blindness.(4)

Amblyopia is the functional reduction in visual acuity due to abnormal visual development earlier in life. It is the most common cause of pediatric visual impairment, accounting for around 1 to 4%. (5, 6)

During the critical period for visual development, any structural abnormalities like strabismus or other risk factors lead to this condition, since amblyopia is due to an earlier defect in the development an early detection of this condition and its risk factors is vital to improve its visual

outcomes in such children. Amblyopia is commonly unilateral but may affect both eyes. It is often associated with impaired or absent stereo acuity.(7)

The revised 2010 estimate showed that the number of blind children in the world has declined in comparison to previous studies. On the contrary in Sub-Saharan Africa, the number of blind children has increased by 31%. (8, 9)

The prevalence of low vision and blindness in Ethiopia is 3.7% and 1.6% respectively having some variability from one region to another. The eye problem in Ethiopia is among the major public health challenges. It has huge implications regarding the economic as well as the social impacts for the affected children, their families, the surrounding community and even the nation at large. (10)

The America Academy of Pediatrics in its Recommendations for Preventive Pediatrics Health Care recommends for Ophthalmological evaluation to be started from the age of 3 years. (11)(11) This would be the beginning of the preschool age group which encompasses the age between 3 and 6 years of age. (12)

Ethiopia being a country with a very low socioeconomic status, and children making up almost 46.4 % of its over 120 million population shows the sensitivity of the issue at hand. The more there are visually impaired children the more the burden and the less productive they are going to be.

The period of visual cortex neuroplasticity is the critical period during which the visual system is affected by outside influences. Appropriately focused visual stimuli are crucial to the development of normal vision. Visual acuity typically reaches the adult level by three to five years of age**. (13)**

## 1.2 Statement of the Problem

According to (WHO, 2013), 285 million people are visually impaired worldwide and a child becomes blind every 5 minutes.(4)

The poorest regions of Africa and Asia are where three-quarters of the world's blind children reside. Out of the 1.4 million blind children globally, about 300,000 live in Africa. (3)

Sub-Saharan Africa has an estimated 5-6 million blind and 16-18 million persons with low vision. Around 60% of them live in twenty African countries. the crude prevalence of blindness for both males and females was the lowest in Equatorial Guinea and the highest in Ethiopia.(14)

The main target of this global initiative of the WHO's 'VISION 2020 with the public health agenda of "Right to Sight' was to eliminate avoidable blindness by the year 2020 however it remains a problem going 3 years on after 2020. (15)

There are several reasons why blindness is given priority and the first one is b/c when a child is blind they will be a lifetime of burden to the family, their society and the country as a whole. the other reason is that preventing blindness has been shown to improve a child's survival mainly b/c of the underlying cause.(16)

Most preschool visual impairment can be prevented or treated by cost-effective measures like simple refractive correction glasses. Early intervention is vital for better visual outcomes like prevention of amblyopia, vision screening as early as preschool age and follow-up care will have a significant, prolonged effect on visual function and social achievements and therefore should be recommended for all children.(17)

National Survey on Blindness and Low Vision in Ethiopia estimates that the prevalence of blindness and low vision is 1.6% and 3.7%, respectively (10). One out of fourteen children in Ethiopia has a visual impairment, making Ethiopia one of the most prevalent cases of blindness in Africa. (15)

The visual problem harms the teaching-learning process and social interactions. Other functions, such as the ability to safely participate in sports are also affected hindering the natural development of the academic and social abilities of the child.(9)

The AAP in its Recommendations for Preventive Pediatrics Health Care recommends for early Ophthalmological evaluation to be started from the age of 3 years.(11)

However, in our country Ethiopia, this recommendation of early screening is not being practiced and this research aims at understanding the magnitude of the problem at an earlier age as per the recommendation of the AAP screening guidelines & assessing the associated factors to demonstrate the benefit of early screening as well as suggesting possible ways to prevent or treat those with visual impairment.

With many of the visual impairments being due to either preventable or treatable causes, early detection or correction of the visual problem at an early age is bound to have educational and behavioral benefits, and certainly enhances the quality of life in general.

## 1.3 Significance of the Study

Preschoolers with uncorrected ametropia had a significant reduction in visual-motor function. A simple measure taken like Wearing spectacles for just 6 weeks improved the Visual-Motor Integration scores to emmetropic levels. VI from uncorrected hyperopia was associated with deficits in early school performance as well as other essential skills for school readiness.(5)

Another study showed More than half (53%) of the current burden of blindness in The Gambia is potentially remediable.(18) In the same line Over 65% of the blindness In northwest Ethiopia was found to be potentially preventable. (19)

Children's inability to know that they have a visual problem because of their perception that everyone sees the same way makes early screening significant.

It has been tried to demonstrate that 70-90% of the classroom learning process is dependent solely or partly on the visual pathway. (20) underlying the importance of early screening in the preschool period before the beginning of formal first-grade education.

Normal visual development requires clear focused images being transmitted to the higher visual centers in the brain and failure of this is bound to affect the maturation process and lead to amblyopia which if caught early has a better outcome and unfortunately can't be treated in the adult life Therefore, early screening is important because there is some level of urgency in the early identification and treatment of such children.(3)

Although visual impairment in preschool children and its associated factors have been studied in developed countries, there have not been any done in Ethiopian preschool children, making this study even more important. Given the importance of this issue at hand and its preventable nature, this could perhaps urge the policymakers to have a system in place where we could screen children as early as in the preschool age group so that we could pick visual impairment early and treat it.

# 2.Literature Review

## 2.1 Prevalence

At least 2.2 billion people have been estimated to have a near or distance vision impairment and of those approximately half of the vision impairments could have been prevented or have not yet been treated. (4)

Regarding the younger population, the meta-analysis done on the population-based cross-sectional studies across 28 countries concerning the prevalence of VI and blindness in those under 20 years of age has shown that the overall prevalence of VI was estimated to be 12.72% based on a UCVA of 20/40 or worse in the better eye, and 7.26% based on a UCVA of 20/60 or worse in the better eye. (19)

An earlier study which was done in 2015 showed more than 174 000 preschool children in the United States had a visual impairment, of which the most common attributed factor accounting for as high as 69% was due to uncorrected refractive error. With 2060, VI is a projection from this study showing to increase by 26%. (17)

Another preschool screening showed that The Presenting VA was decreased in the worse eye which was 4.2% in Asian children alone and around 3.6% in the non-Hispanic white children. (21)

The prevalence of blindness in Gambia in those less than 19 years of age is 0.07% but the figures were exclusive of the visually impaired children in blind schools. The study didn’t show any difference in blindness between the rural and poor urban areas. (18)

A systematic review and meta-analysis in 2022, puts the overall prevalence of visual impairment among children in Ethiopia at 7% (95% CI: 6,7%). The overall pooled prevalence was similar in Addis Ababa which was put at 6%. (15)

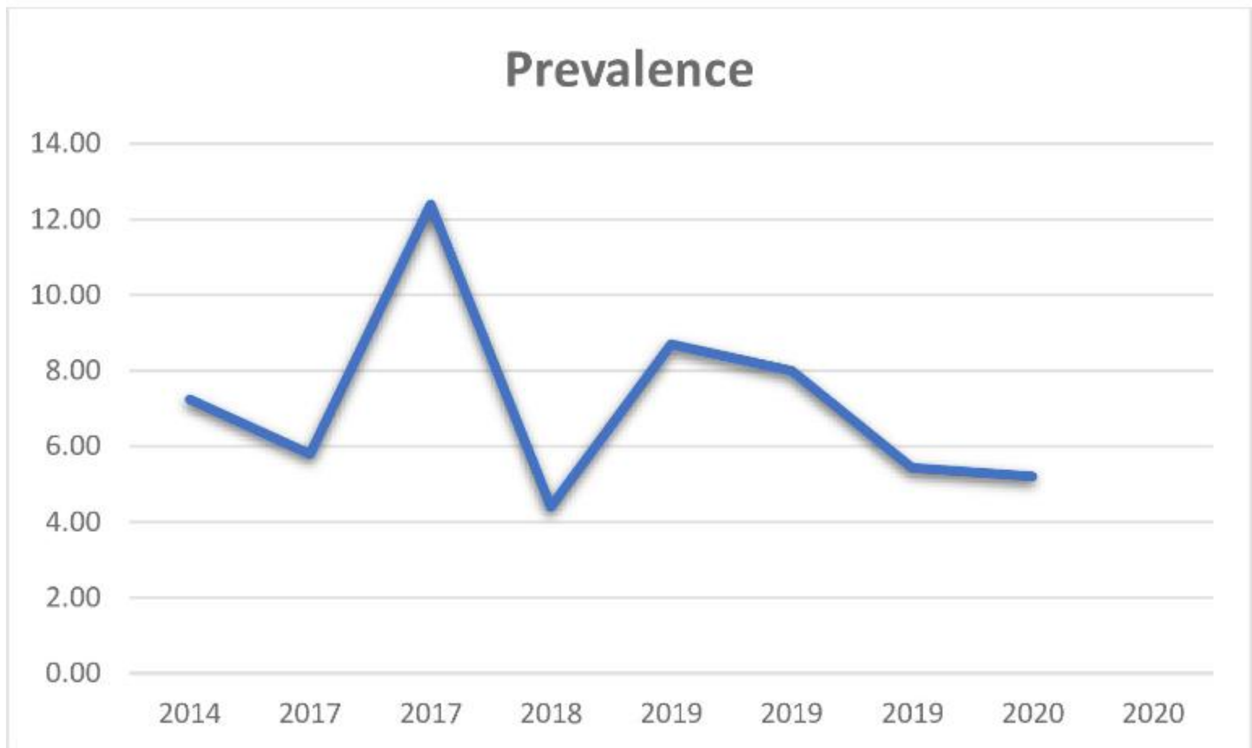


**Figure 1 :- In Ethiopian children b/n the age of 0-18 years There was a relatively higher prevalence of visual impairment in its study area in 2017 but decreased in 2018 and also 2020.(1)**

## 2.2 Associated factors

The main risk factors associated with an increased risk of developing amblyopia include Prematurity, being a small size for gestational age, having a first-degree relative with amblyopia and the presence of neurodevelopment delay. (22)

The commonest causes of visual impairment in preschool children residing in the United States was attributed due to uncorrected refractive error(69%), followed by bilateral amblyopia which accounted for 25%.(17)

This finding was backed also by a similar outcome found as Seventy percent of all decreased VA in Asian and non-Hispanic white preschool children is attributed to refractive error which was either due to an uncorrected refractive error or amblyopia resulting from refractive error. (21)

The major causes of childhood blindness In Nigeria were cataracts (52.6%), retinal disorders (14.1%) and trauma (11.7%). (8)

According to the National Survey on Blindness, Low Vision and Trachoma in Ethiopia, the major causes of low vision and blindness included cataracts, refractive error, and trachomatous corneal opacity, with up to 91.2% of the identified problems having been attributed to either preventable or a treatable cause. (10)

Research conducted in Northwest Ethiopia on the reasons behind severe visual impairment and blindness in students going to schools for the blind found that among students who are under 16 years old many childhood factors, including measles and vitamin A deficiency, were the main cause, accounting for 39.4% of cases. The second most common cause was unknown, accounting for 54.8% of cases, followed by perinatal and hereditary factors at 2.9% each. And interestingly more than 80% of the causes could have been prevented, as the majorities were potentially avoidable, in 65% of cases. (23)

Different research indicated that male children between the ages of 10-13 years and 14-18 years were less prone to visual impairment, with an adjusted odds ratio of 0.224 and a 95% confidence interval. If anything, children whose parents had visual impairment had a greater likelihood of experiencing visual impairment. The study also found that female children had a higher chance of developing visual impairment, such as myopia. (15)

Corneal blindness which is merely a result of measles and vitamin A deficiency, is still a public health problem in the Northwest part of Ethiopia.(23)

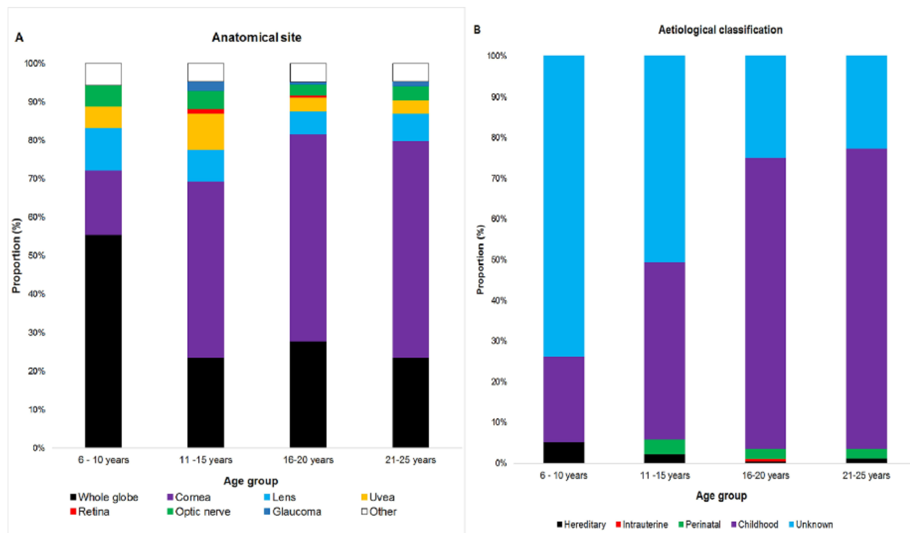


**Figure 2 Anatomical site (A) and (B) Etiologies of different age groups. Which was done from students of 383 students attending nine schools for the blind in Northwest Ethiopia were examined and causes were assigned using the standard WHO record form.(2)**

## 2.3.Conceptual Framework & Study variables

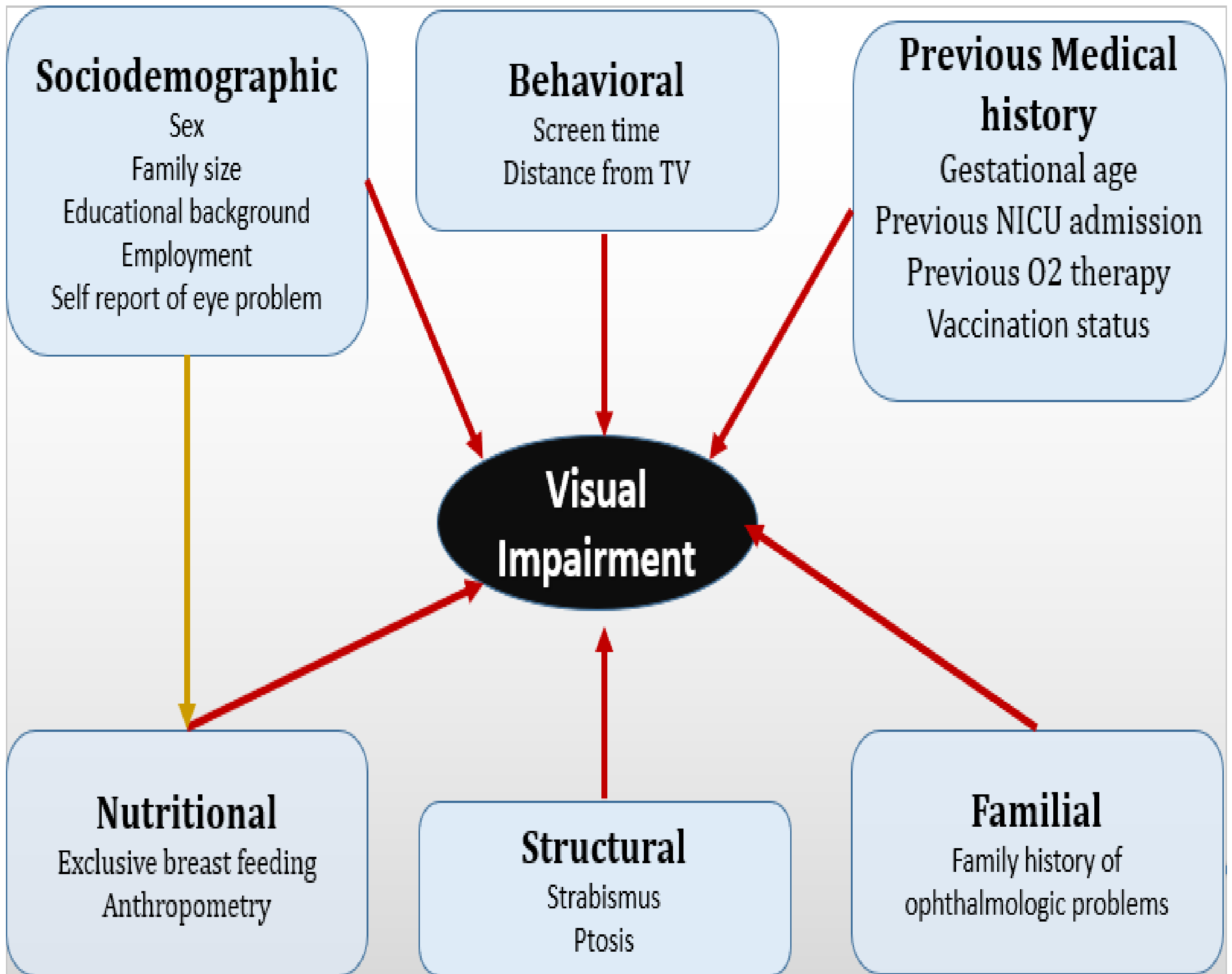


**Figure 3** Conceptual framework

# 3. Objectives

## 3.1 General Objective

- To Determine the prevalence and the associated factors of visual impairment among preschool-age children in selected Kindergartens schools in Addis Ababa, Ethiopia

## 3.2 Specific Objectives

- To determine the prevalence of visual impairment among preschool children in kindergarten schools in Addis Ababa Ethiopia.
- To assess the associated factors of visual impairment among preschool children in kindergarten schools in Addis Ababa Ethiopia.

# 4 METHODS AND MATERIALS

## 4.1 Study area

Addis Ababa is the capital and largest city of Ethiopia which according to the 2007 census, the city's population was estimated to be 3,602,000 inhabitants. From this under 5 years of age accounts for 1,134,150 which accounts for 31.4%. (12)

Kindergarten is a program for 4 to 6-year old. Kindergarten is mainly a three-year program at nursery, lower kindergarten and upper kindergarten at ages 3-4, 4-5 and 5-6 years. This program has its curriculum, trained teachers, administrative staff, and school compounds. Most of the kindergarten schools are operated by nongovernmental organizations such as communities, private institutions, and religious organizations

The total enrollment in the year 2019/2020 was around 219,456.

The particular study area is going to be in 4 selected kindergartens residing in Addis Ababa.

## 4.2 Study period

This study was conducted from September 29 to October 29 coinciding with the time of the beginning of new school year.

## 4.3 Study design

A cross-sectional study

## 4.4 Source Population

Preschool children age (3 – 6 years) who attended kindergarten schools in Addis Ababa.

## 4.5 Study population

Preschool Age Children in selected KG School During the study Periods who fulfilled the inclusion criteria.

## 4.6 Sampling method

According to a study done in Kola-Deba, Ethiopia on prevalence of refractive error in preschool and school aged children the p-value was taken as 7.6%.(24) With a level of confidence interval of 95% and 5% precision; the minimum number of samples required for this study will be determined by using single population proportion formula.

$$n = \frac{Z^2pq}{d^2}$$

**Sample size was calculate using simple population formula**
**N** = total sample size
**Z** = 1.96
**P** = 0.076% Based on a study conducted in Kola-Deba on prevalence of Refractive error in pre-school and school age children.
**q** = 1-p
**d** = Margin of error 5% (0.05)

The final sample size calculated using the above formula and adding non-response rate of 10% is **119**. Since we used multi-stage sampling technique considering design effect we multiplied final sample size by 2 making the total sample size to be **238**.

## 4.7 Sampling Procedure

Multi-stage cluster sampling technique was used to select the kindergartens. According to the data collected in 2014 by the Ethiopia Ministry of Education, There are 1079 preschools in all the 11 sub-cities in Addis Ababa. Two Sub cities that ranked first were selected from those 11 sub-cities present in Addis Ababa by lottery method. Gulele and Kolfe Keranio sub-cities were chosen using the Lottery method. There are 72 and 156 preschools in total in Gulele and Kolfe Keranio sub-cities respectively. Of which 51 and 134 of the preschools are private sector owned in the respective sub cities. (25)

Two schools from each sector were randomly selected from the two sub-cities each using a random number generator using Excel after identification No was assigned to each school in the two sub-cities selected. Then from this selected schools after getting approval from the Minister of school of each sectors we were able to get the names of each students from KG I to KG III.

From this list we were able to randomly select children through excel random number generator to select the children.

When a child was found absent from school during the study period, the next child was included in the study.

It was assured that the reason for absence was not related with eye condition of the child. (Meaning no ocular illness or problem related with vision).

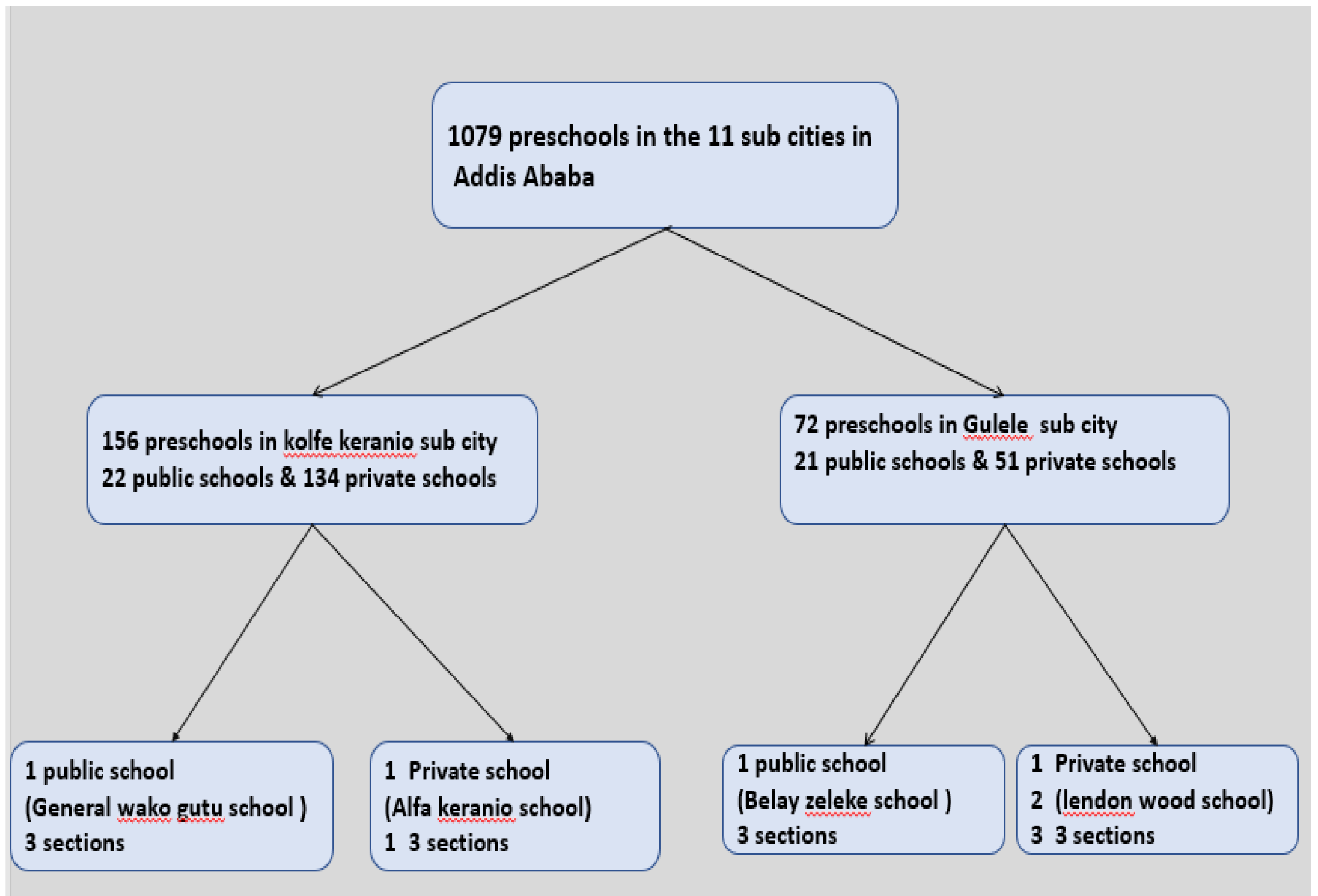


**Figure 4 Flow diagram of Sampling Procedure, Addis Ababa Preschools update on 2014. Ministry of Education (25)**

# 4.8 Selection criteria

## 4.8.1. Inclusion criteria

- All preschool-age children in the selected schools who had verbal or written consent from their parents were included.

## 4.8.2Exclusion criteria

- Students, who didn't  give full cooperation, have not got a written consent from parents
- Students with an incomplete research questioner

# 4.9 Study Variable

## 4.9.1 Dependent Variable

Visual Impairment

## 4.9.2 Independent Variable

**Socio-demographic Characteristics**: Age, family size, educational background

**Nutritional factors***:* Anthropometry, History of exclusive breastfeeding

**Behavioral factors**: Screen time, distance from TV

**Previous Medical history***:* previous NICU admission, Vaccination status, Previous $O_2$ therapy

**Presence of Structural Abnormalities***:* Strabismus, ptosis

**Familial History of ophthalmological problems**

# 4.10 Operational Definition

**Vision impairment**; - The World Health Organization (WHO) released the International Classification of Diseases 11,2018 which classifies vision impairment into two groups, distance and near vision impairments.(4)

**Distance vision impairment:** (4)

**Mild** – presenting visual acuity worse than 6/12 to 6/18

**Moderate** – presenting visual acuity worse than 6/18 to 6/60

**Severe** – presenting visual acuity worse than 6/60 to 3/60

**Blindness** – visual acuity worse than 3/60

**Near vision impairment**: -Near visual acuity worse than N6 or M.08 at 40cm.

**Preschool age**: - The age groups that encompass between the ages of 3 to 6 years of age. (12)

**Amblyopia** is a functional reduction in visual acuity caused by abnormal visual development early in life. (6)

**Unilateral amblyopia** is defined as a difference in visual acuity between eyes that is ≥2 lines on a standard vision chart

**Bilateral amblyopia** (also known as ametropic or isoametropic amblyopia) is defined as visual acuity worse than 20/40 in both eyes (in children ≥4 years) or visual acuity worse than 20/50 in both eyes (in children ≤3 years) in the setting of severe uncorrected refractive error in both eyes.

**Electronic Screen Devices/Electronic visual displays**:- According to Wikipedia are defined as television sets computers, including those of mobile computing applications like tablet computers, smartphones, and information appliances.

**Screen Time**: time spent for activities done in front of a screen, such as watching TV, smartphones, tablets, working on a computer, or playing video games.

# 4.11 Data collection tool and measurement

The data was collected by two optometrists who were also be trained on the data collection process, and sections of the questionnaire, vision screening techniques and protocols as recommended by the AAP, and AAPOS. Initially all the parents were notified of the screening program via a telegram group page for the parents on both the private school. Some Sections from the questioner like socio-demographic, child birth history and medical history, electronic exposure, nutritional history were filled by parents/primary caregivers on pre handed out questioner forms sent via the children and given out through the teachers and one data collector during the times the parents came to school to drop or pick up their child. Some questioners were filled on the spot by the data collector well. Whereas the physical examination section of the questionnaire was completed by the trained optometrists. These optometrists screened the children which had a consent form signed each taking one private and one public schools. HTOV was mainly used to measure visual acuity in children age 3-5 whereas and Lea symbol chart was also used for those younger preschool children based on their cooperation. For those whose age

was above 5years Snellen chart was used to measure visual acuity in children. The primary investigator revised the filled Questionnaires for completeness, and for those incomplete data on the questionnaires the parents were called on the phone in an effort to complete the data based on the phone number they gave on the consent form.

# 4.12 Data Processing and Analysis

The collected data was entered and cleaned and then SPSS version 25 was used for the required analysis. Frequencies and percentages were calculated for all the variables that are related to the objectives. Descriptive statistics using cross-tabulations was implemented to assess the frequency distribution of independent variables. Correlation and Binary Logistic regression were used to assess factors related to visual impairment among preschool children. Variables with p values <0.25 in binary analysis were entered to multivariable logistic model regression for analysis to control for confounders. The magnitude of the association between independent variables and dependent was measured using odds ratios with 95% Confidence Interval (CI). The P values below 0.05 were considered as statistically significant. The data will be presented using tables and narrative forms.

# 4.13 Data Quality Assurance

Data was collected using an interviewer-administered questionnaire after training was provided to the data collectors on the details of the questionnaire. Two optometrists and one supervisor participated in the data collection process. The data collectors were given two days of training on the objectives of the study and different sections of the questionnaire, and interviewing techniques by the researcher.

A questionnaire filled out was checked for completeness and consistency daily by Investigator . The investigator was responsible for monitoring the overall data collection process and providing supportive supervision on the spot. The data collected was carefully entered and cleaned before analysis.

# 4.14. Ethical Consideration

Before data collection to conduct this study, Ethical clearance was obtained from the institutional review board (IRB) at Tikur Anbessa Specialized Tertiary Hospital and submitted to the selected preschools. The Confidentiality was fully maintained during the Data collection process and the analysis and dissemination of results.

All students screened were with the consent of the parent/caregiver of the child. The parents had every right to refuse the screening of their child. They were also be notified of any abnormal screening findings of the child with a recommendation for an ophthalmologist evaluation.

# 4.15. Dissemination of Findings

The output of this study will be displayed both in tabular and graphical presentations. The finding of the study will be presented on the research defense day and a formal report will be submitted to the Department of Pediatrics and Child Health with both soft and hard copies. The research output will also be published in local or international scientific journals.

# 5. Results

## 5.1 Socio-demographic Characteristics of Study Participants

A total of 229 children whose age ranged between 3-6 years participated in this study. In this distribution, the age of 5 years has the highest representation with 42.36% of the dataset (97 individuals), followed by 6 years at 32.31% (74 individuals), and 4 years at 24.89% (57 individuals). There is a single instance of an individual aged 3 years, making up 0.44% of the dataset. This summary provides a clear view of the age distribution within the dataset, highlighting the concentration of ages around 4 to 6 years. Fig 1, illustrates the concentration of ages around 4 to 6 years, with 5 years being the most common age.

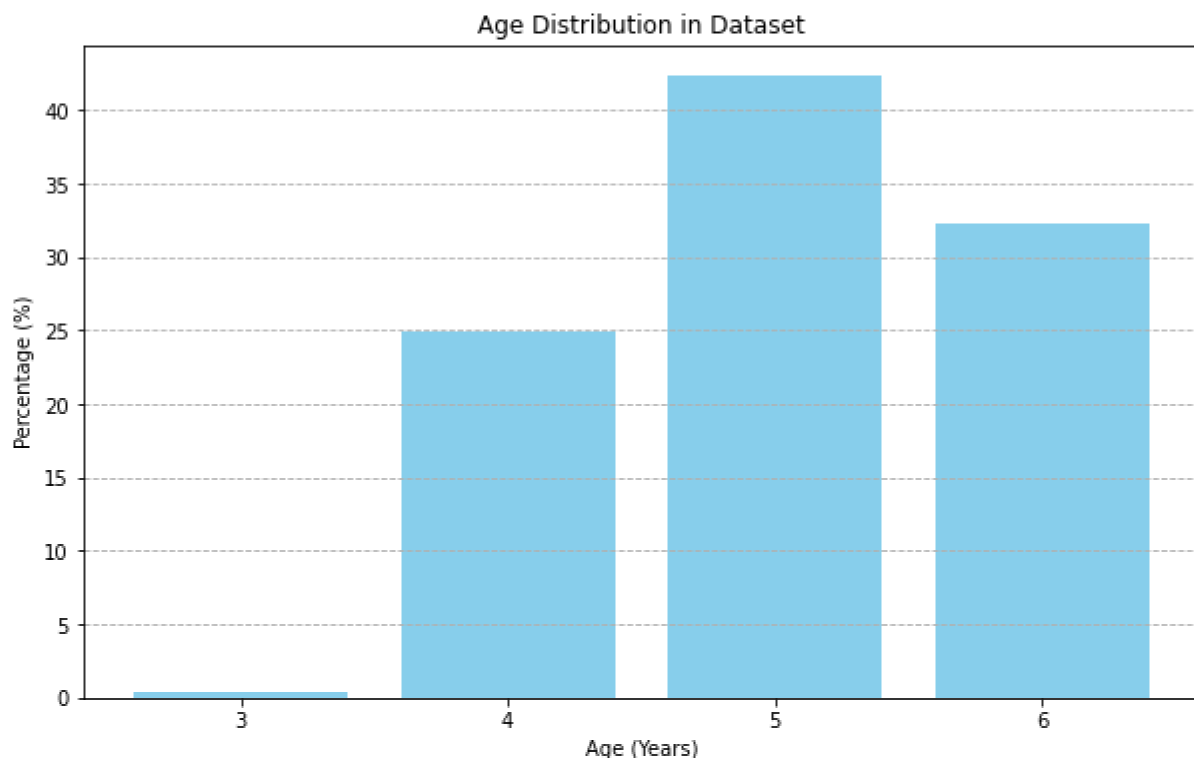


**Figure 5 Age distribution in the dataset**

In this distribution, males represent 58.08% of the dataset (133 individuals), while females account for 41.92% (96 individuals), highlighting a higher representation of males compared to females.

The distribution of family sizes shows that families with 4–6 members are the most common, representing approximately 45.85% of the dataset, closely followed by families with fewer than 4 members, which account for about 44.98%. Families with more than 6 members are the least

common, making up only 9.17% of the dataset. This indicates a relatively even distribution between families of fewer than 4 members and those with 4–6 members, with larger families being significantly less common. The majority

937.1%) of the family who participated in this study earn 2000-5000 ETB per month followed by families who earn from 500-10000 EBR per month.

**Table 1: Socio-Demographic Characteristics of Parents/Caregivers**

| | Educational Level of Care givers | Percentage | Frequency |
|---|---|---|---|
| 1 | Diploma and above | 46.28 % | 106 |
| 2 | Secondary school | 24.89 % | 57 |
| 3 | Primary school | 24.89 % | 57 |
| 4 | Uneducated | 3.93 % | 9 |
| | **Religion** | | |
| 1 | Orthodox | 61.57 % | 141 |
| 2 | Muslim | 19.65 % | 45 |
| 3 | Protestant | 18.34 % | 42 |
| 4 | Others | 0.436 % | 1 |
| | **Employment Status of care givers** | | |
| | **Employed** | 85.58 % | 196 |
| | **Unemployed** | 14.41 % | 33 |
| | **Family Size** | | |
| | **< 4** | 44.98% | 103 |
| | **4-6** | 45.8% | 105 |
| | **>6** | 9.17% | 21 |

## 5.2 Child birth history and Previous Medical history

A significant majority of newborns were born at or beyond 37 weeks of gestation, representing approximately 93.01% of the total, which translates to 213 cases. In contrast, newborns born before 37 weeks, categorized as preterm, account for only about 6.99% of the dataset, equating to 16 cases.

The majority of the participants/children, 188 (82.1%), were delivered by SVD while the rest 41 (17.9%) were delivered by CS. Analysis on the distribution of admissions to the NICU indicates that 82.53% of the cases did not require admission to the NICU, translating to 189 instances, while 17.47% of the cases, or 40 instances, and did require NICU admission.

The distribution of previous O2 therapy indicates that 88.21% of the cases did not receive previous O2 therapy, translating to 202 instances, while 11.79% (27) of the cases and did receive O2 therapy.

The distribution of vaccination status in the dataset indicates that 87.77% of the individuals were fully vaccinated, amounting to 201 cases, while 12.23%, or 28 cases, were partially or unvaccinated.

Seventy seven (76.86%) of the respondents reported exclusive breastfeeding, while 23.14% reported not practicing exclusive breastfeeding.

The distribution of the history of head and eye trauma indicates that 85.15% of the individuals did not have a history of trauma to the head or eye, translating to 195 cases, while 14.85%, or 34 cases, did have such a history.

## 5.3 Maternal characteristics

The distribution of maternal alcohol consumption during pregnancy in the dataset is visualized below. The majority of mothers, 211 or 92.14%, reported not consuming alcohol during pregnancy, while a smaller portion, 18 or 7.86%, reported consuming alcohol.

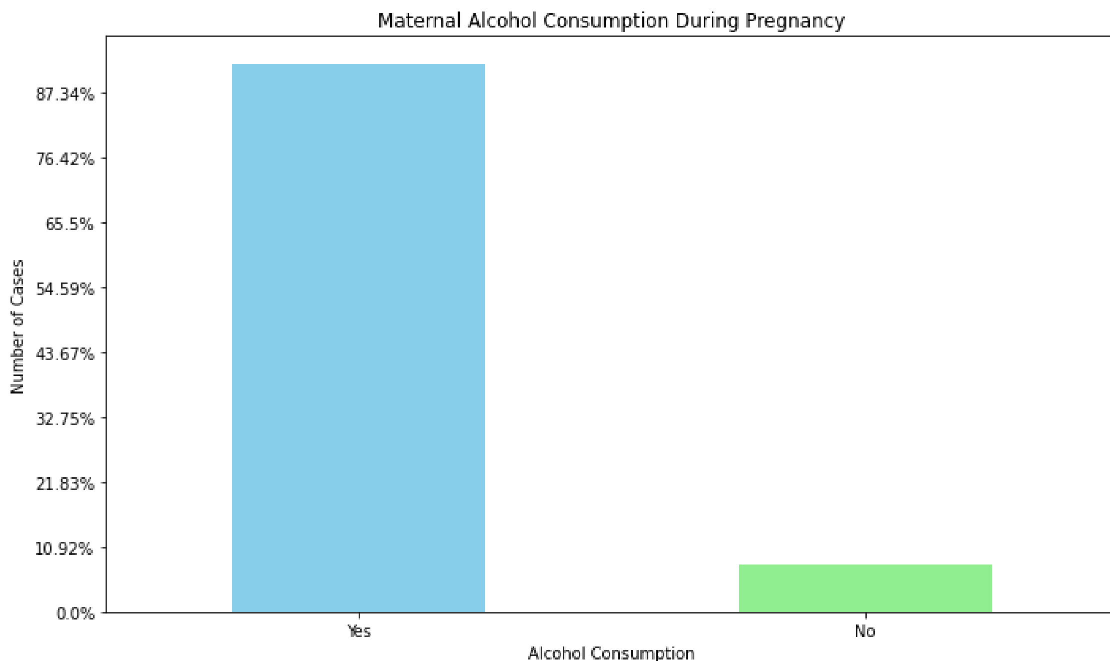

**Figure 6: Maternal Alcohol consumption during pregnancy**

In the dataset, 12 mothers (5.24%) reported having a systemic illness during pregnancy, while 217 mothers (94.76%) reported not having any systemic illness. Among those who reported the illness 4.4% were due to preeclampsia and the rest were due to unspecified causes.

## 5.4 Electronic Device exposure

The distribution of history of television exposure among children in the dataset displayed significant majority, 214 or 93.45%, were reported to have a history of television exposure, while a small fraction, 15 or 6.55%, were reported not to have any history of television exposure. Of those who had exposure the majority, 116 children or 52.97%, were exposed to television for less than 2 hours per day. A significant portion, 71 children or 32.42%, had exposure for 2–4 hours per day, and a smaller group, 32 children or 14.61%, were exposed for more than 4 hours per day. A significant portion, 107 children or 48.86%, were exposed to television from a distance of less than 2 meters. Another 88 children or 40.18% watched television from a distance of 2–4 meters, and a smaller group, 24 children or 10.96%, from a distance of more than 4 meters.

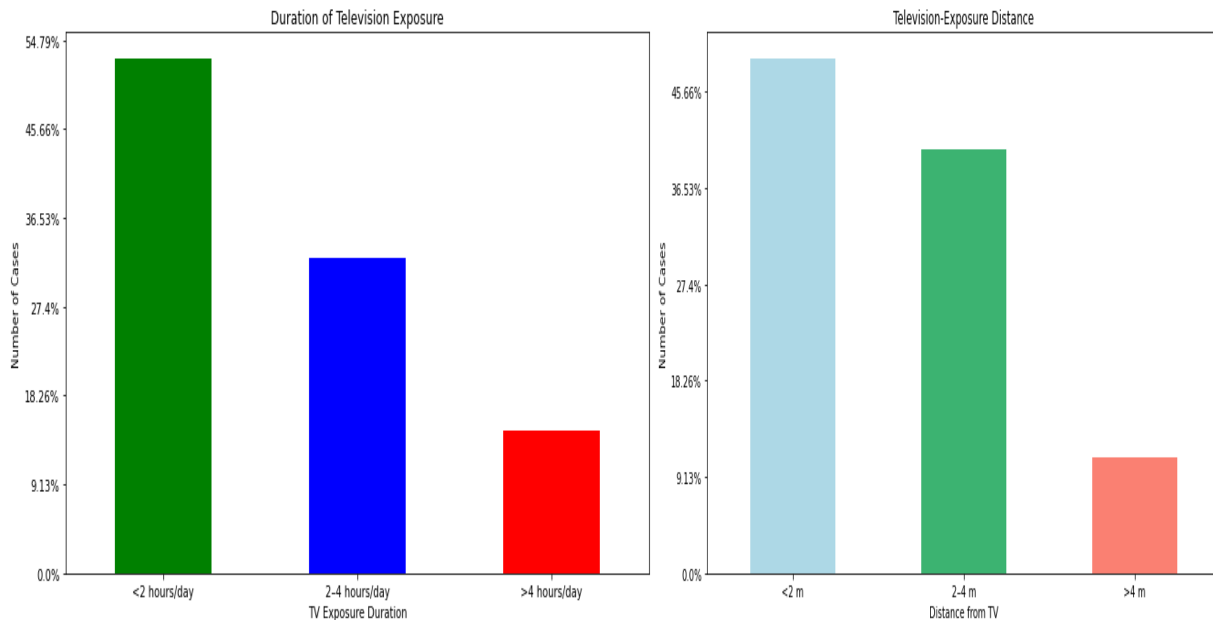


**Figure 7** Behavioral characteristics of Pre-school children; A.Duration of Television exposure, B. Distance from TV

Among the total number of children screened, 161 children (71.24%) had no exposure to mobile/computer, 34 children (15.04%) were exposed for less than 2 hours per day, 29 children (12.83%) for 2–4 hours per day, and 2 children (0.88%) for more than 4 hours per day.

Significant majority of children studied had mobile/computer exposure .161 children or 71.24%, were exposed for less than 2 hours per day A smaller portion, 34 children or 14.8%, had exposure for 2–4 hours per day Even fewer, 29 children or 12.7%, were exposed for more than 4 hours per day., and a minimal number, 2 children or 0.88%, had no exposure to mobile/computer devices.

## 5.5. Family history

The distribution of family history of ophthalmologic problems in the dataset indicates that 89.96% of the respondents reported no family history of ophthalmologic problems, while 10.04% reported a family history of such problems.

Also the self-reported eye problems by the parents/caregivers in the dataset indicates that 90.39% of the respondents reported no self-history of eye problems, while 9.61% reported having a history of noticing unspecified eye problems.

## 5.5. Physical Examination Findings

Upon **penlight evaluation of the lids, conjunctiva, sclera, cornea, and iris for** any discharge or reddish eye color changes showed that 88.65% of the children did not have any discharge or reddish eye color changes, while 11.35% had such findings.

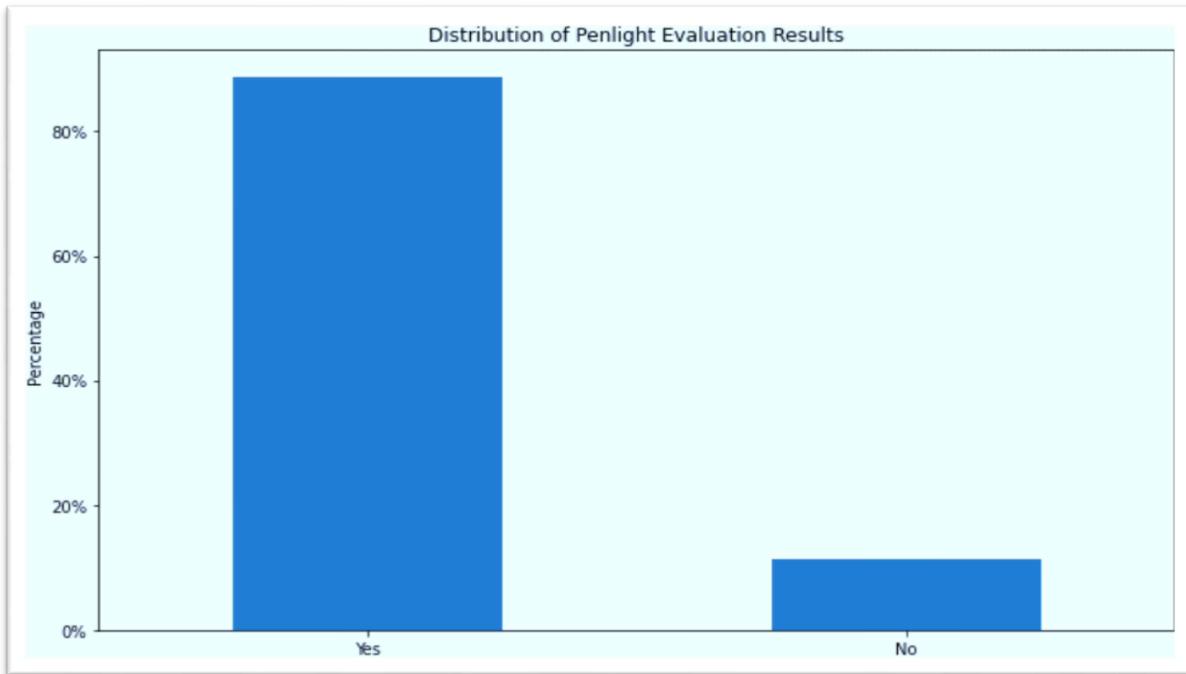


***Figure 8. Distribution of Penlight physical examination***

Regarding the ocular motility it shows that 99.56% of the observations reported normal ocular motility (H pattern), while only 0.44% did not exhibit normal ocular motility.

The symmetry of “Ocular alignment" shows that there are 227 observations classified as Symmetrical, making up 99.13% of the dataset, and only 2 observations classified as Asymmetrical, accounting for 0.87% of the dataset.

The rest of the physical examination findings namely MUAC, Ptosis, Pupillary & corneal light reflexes, and the presence of simultaneous red reflex exhibited the normal finding result in all 229 children.

The total number of samples taken was 229. Out of the total screened preschool children there was a total of a 25 children were deemed to have an indication for further ophthalmology evaluation based on the indications for referral as per the American association of certified orthoptists (out of the 8 indication) are depicted in the figure below. All the parents and their schools were notified of the indication for evaluation and they were offered for further evaluation at a hospital for free and 5 out of the 25 came . of the 5 children 3 of them were found to be normal and 1 child was diagnosed with Astigmatism and 1 child had refractive error.

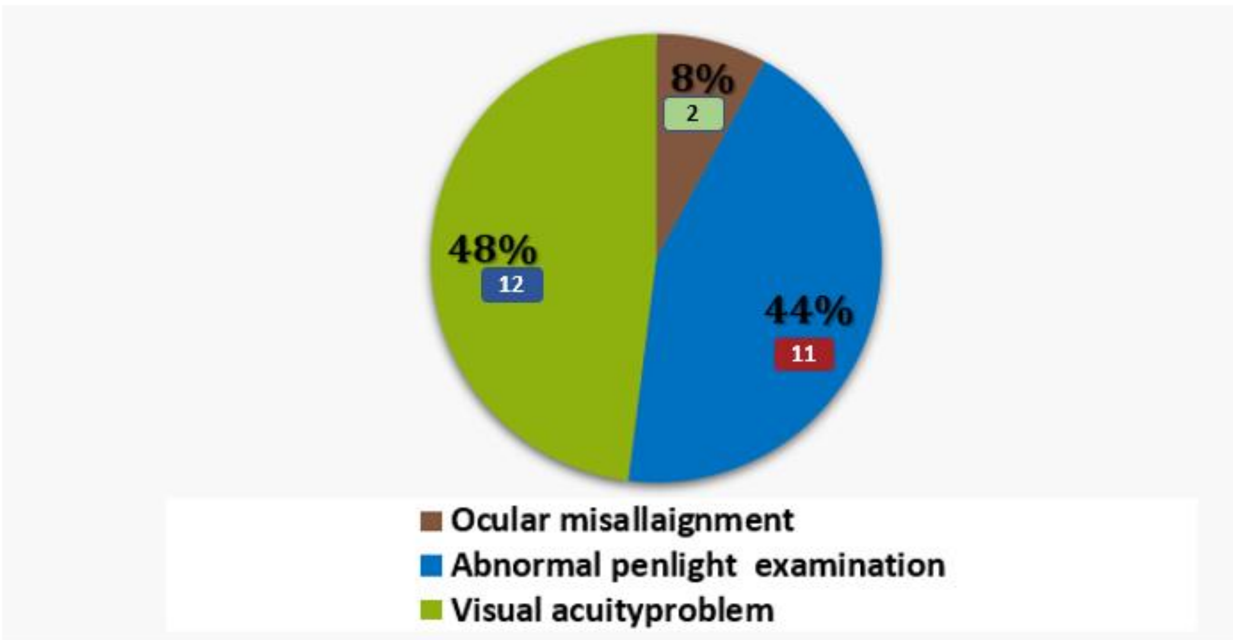


**Figure 9: Physical Eye Examination Finding of preschool-children in selected Kindergartens in Addis Ababa**

## 5.6 Prevalence of Visual Impairment

### 5.6.1 Visual acuity OS (Left eye)

The distribution of monocular visual acuity for the left eye (OS) among individuals in the dataset, with the majority (93.01%) having a specific category of visual acuity, followed by smaller percentages in other categories.

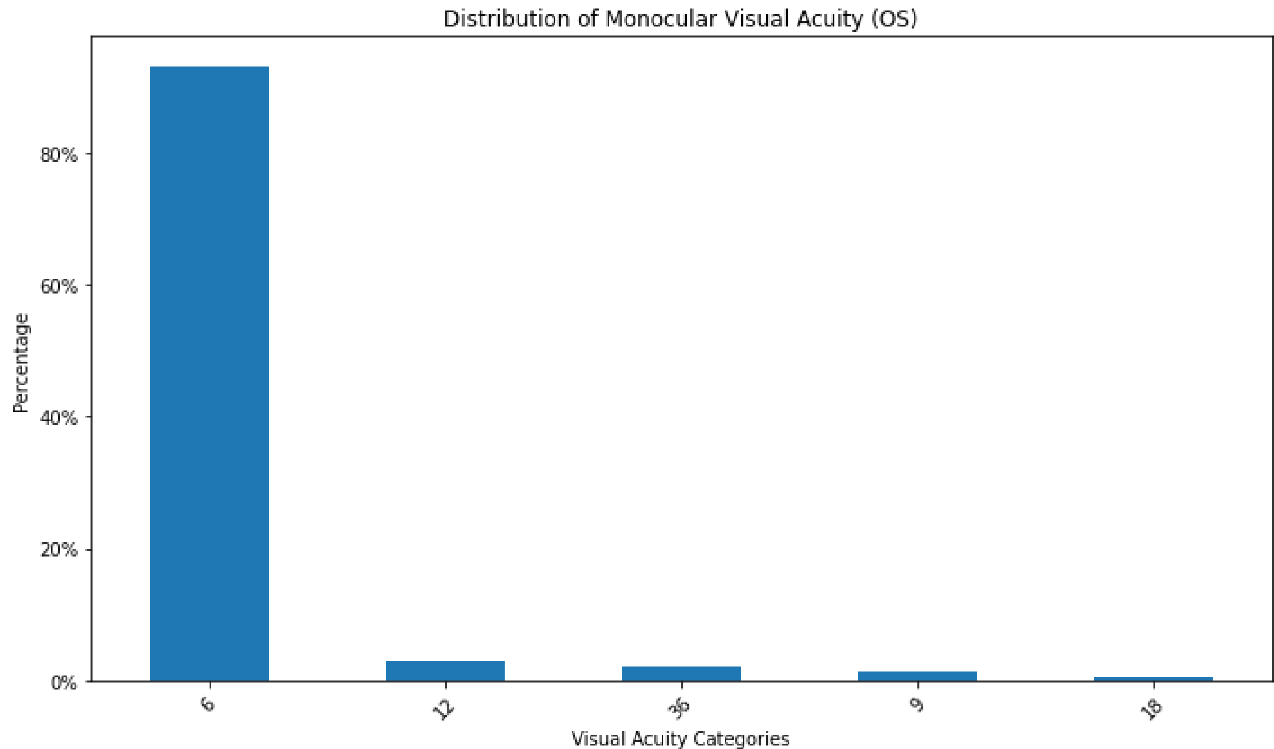


**Figure 10**: Distribution of Monocular visual acuity **(**OS)

Based on our operational definition 94.32% of the screened preschool children had normal vision while the rest meaning 5.66% had visual impairment on the left eye which is vision worse or equal to than 6/12.

### 5.6.2. Visual acuity OD (Right eye)

The distribution of monocular visual acuity for the right eye (OD) among individuals in the dataset, with the majority (93.89%) having a specific category of visual acuity, followed by smaller percentages in other categories.

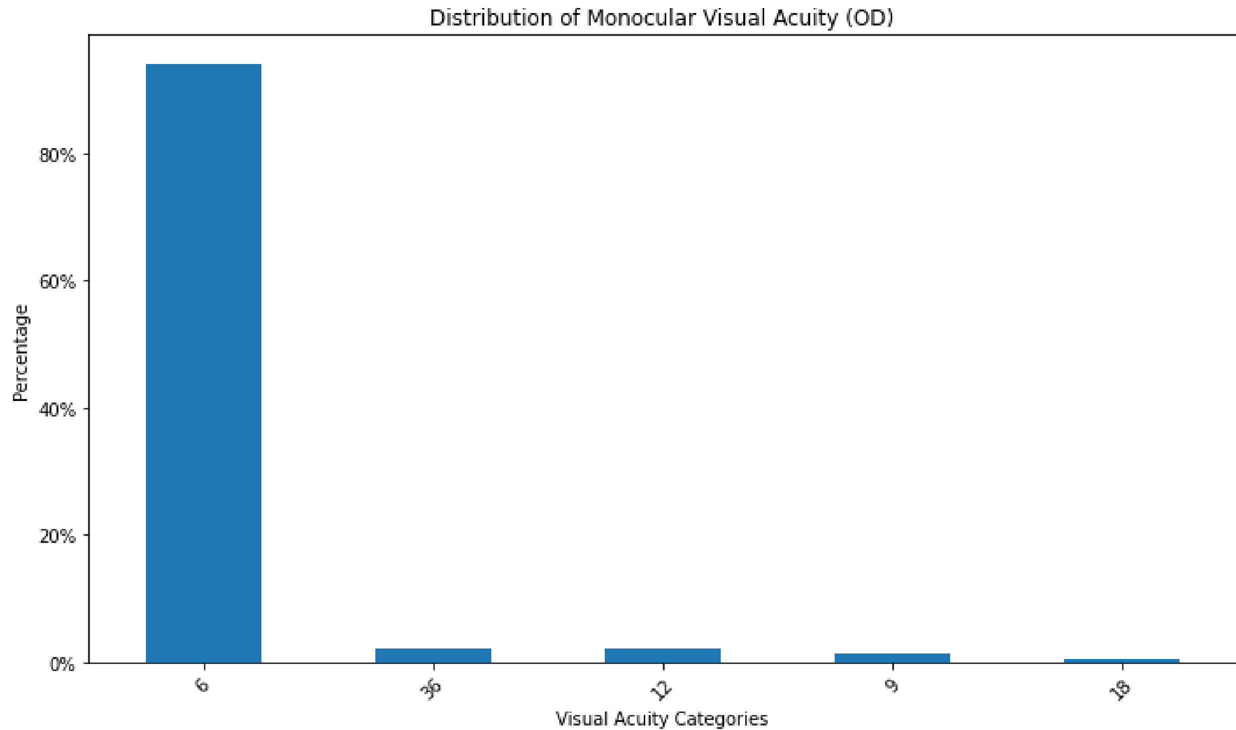


**Figure 11**. Distribution of Monocular Visual Acuity (OD)

Based on our operational definition 95.196% of the screened preschool children had normal vision while the rest meaning 4.63% had visual impairment on the right eye which is vision worse or equal to 6/12.

The total prevalence of visual impairment among preschool age children according to the operational definition of visual impairment on either eye is that **94.76%** of the observations reported no visual impairment, while **5.24%** reported visual impairment.

Among those with **2.6% of the pre-school children had mild visual impairment** and **2.6% of the students had moderate visual impairment.** None of the pre-school children who were screened during the data collection process had severe visual impairment.

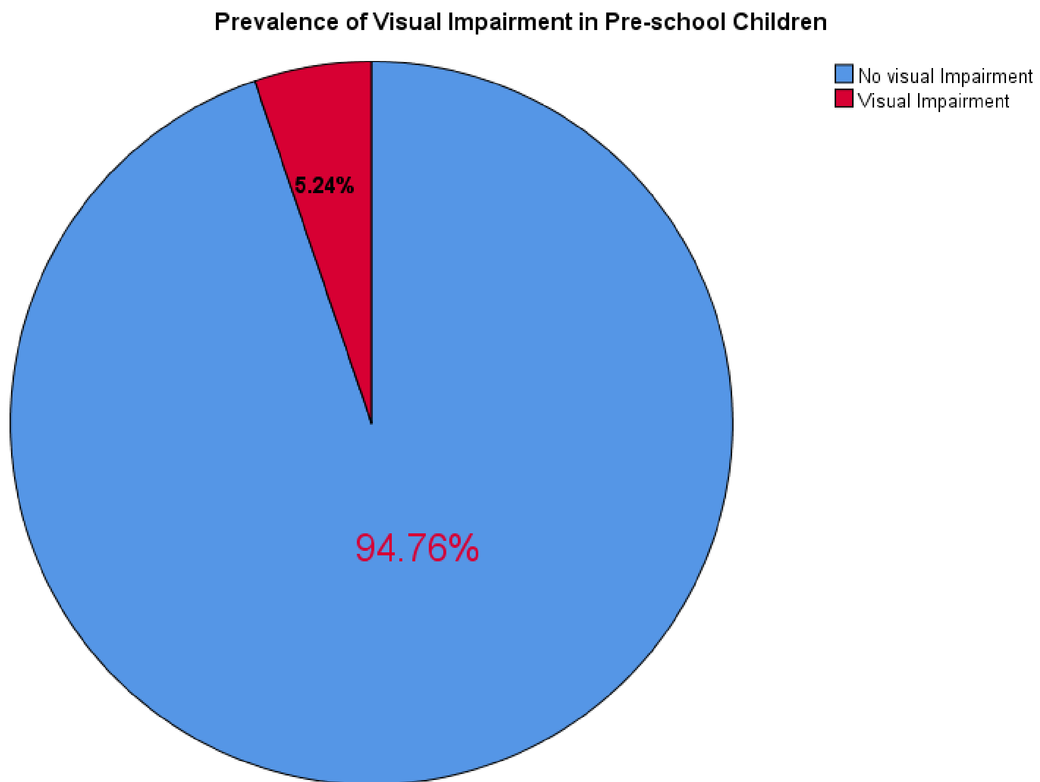


**Figure 12. Prevalence of Visual Impairment in Pre-school children in Addis Ababa, Ethiopia**

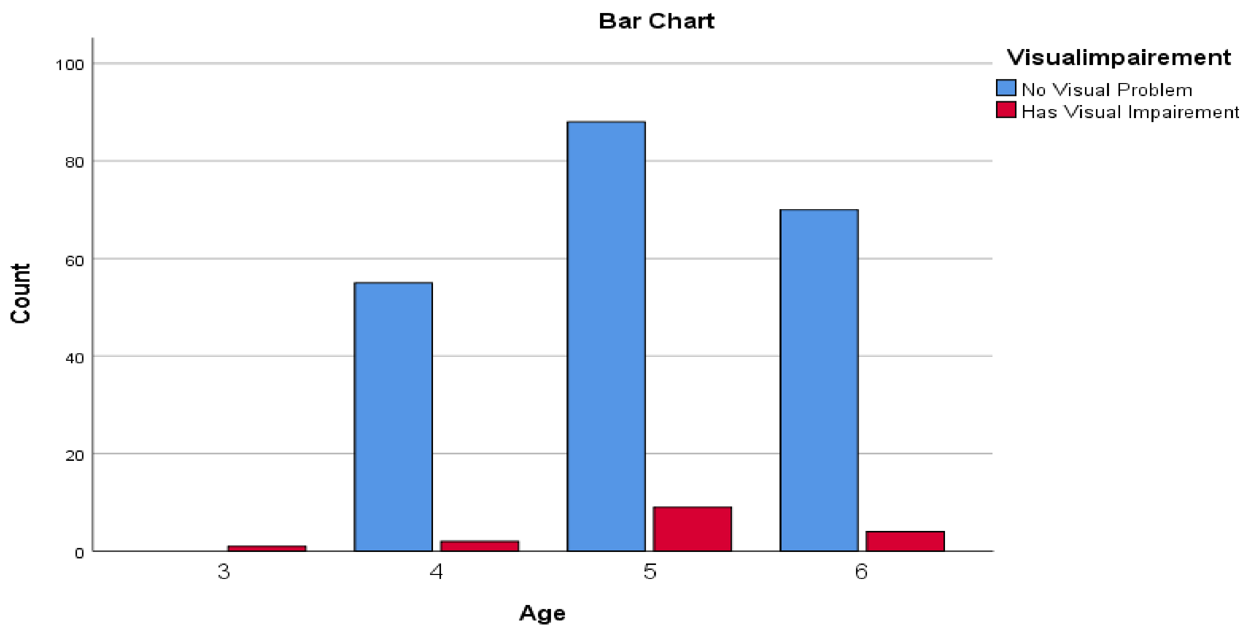


Figure 13 **: The distribution of visual impairment by age is depicted as follows**

## 5.7 Factors Associated with Visual Impairment

Among the independent variables that were analyzed using binary logistic regression being employed, preterm at birth, maternal alcohol consumption during pregnancy, family history of ophthalmological problems, abnormal penlight evaluation and having ocular misalignment were found to be significant at p< 0.25. From these variables that were analyzed by multivariable analysis maternal alcohol consumption and abnormal penlight evaluation were found to be significant with p< 0.05. Table 10 illustrates the details of factors associated with Visual impairment in preschool children.

This study has showed that those pre-school children whose mothers had alcohol consumption during pregnancy are 8 times more likely to have visual impairment than their counterparts **(AOR=8.529, 95% CI (1.51-48.02))** The study also revealed that pre-school children who had abnormal pen light evaluation were 18 times more likely to have visual impairment than those children who don't **(AOR=18.932, 95% CI (3.85-92.89)).**

**Table 2**: Bivariate and Multivariable Logistic Regression Analysis of factors associated with visual impairment among pre-school children in selected kindergartens found in Addis Ababa.

| Variables | | COR | P-value | AOR | P-value | Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| **Employment** | Yes | 0.309 | 0.068 | 0.270 | 0.089 | 0.06 | 1.22 |
| | No | 1 | | 1 | | | |
| **Gestational age** | <37wk | 2.9 | 0.195 | 5.055 | 0.112 | 0.68 | 37.23 |
| | >37wk | 1 | | 1 | | | |
| **Maternal alcohol** | Yes | 7.250 | 0.003 | 8.529 | **0.015*** | 1.51 | **48.02** |
| | No | 1 | | 1 | | | |
| **History of EBF** | Yes | 3.467 | 0.239 | 3.168 | 0.328 | 0.31 | 31.97 |
| | No | 1 | | 1 | | | |
| **Family history of ophthalmological problems** | Yes | 3.283 | 0.093 | 3.887 * | 0.156 | 0.59 | 25.31 |
| | No | 1 | | 1 | | | |
| **Abnormal penlight examination** | Yes | 9.850 | 0.00 | 18.932 | **<0.01*** | 3.85 | **92.89** |
| | No | 1 | | 1 | | | |
| **Ocular Alignment** | Yes | 0.102 | 0.071 | 0.246 | 0.392 | 0.10 | 6.10 |
| | No | 1 | | | | | |

*Key: *statistically significant variable at 95% CI with P value<0.05, COR: Crude odds ratio, AOR adjusted odds ratio, CI: confidence interval*

## 5.8 Correlation of visual Impairment with other Numeric variables

These coefficients indicate that the relationships between visual impairment and the demographic variables are generally weak. Age and visual impairment have very weak correlation as depicted in Table 3. This implies almost no relationship between age and visual impairment within this dataset. There is weak negative correlation between monthly income and visual impairment, suggesting that higher monthly incomes might be slightly associated with lower rates of visual impairment.

**Table 3**: Correlation of Visual Impairment with Socio-demographic Characteristics

| Demographic variable | Visual impairment |
|---|---|
| Age | -0.023 |
| Monthly income | -0.086 |

Correlations between behavioral factors and visual impairment are generally weak, indicating that while there may be slight tendencies or associations between visual impairment and these behavioral factors, the relationships are not strong. Table 4 The notable association, weak negative correlation (-0.074), suggesting a slight tendency for visual impairment to decrease as the distance from the TV increases. A very weak negative correlation is seen almost no relationship between the duration of TV exposure and visual impairment. A very weak negative correlation (-0.045), indicating almost no relationship between the duration of mobile or computer exposure and visual impairment.

**Table 4: Correlation of Visual Impairment with Behavioral Characteristics**

| Behavioral factors | Visual impairment |
|---|---|
| Visual impairment | 1.0 |
| Duration of TV exposure | -0.0418 |
| Distance from TV | -0.074 |
| Duration of mobile exposure | -0.0448 |

# 6. Discussion

According to this study the prevalence of visual impairment among preschool age children Based on the operational definition of visual impairment on either eye is found to be 5.24%. This is less than the systematic review and meta-analysis done in 2022, which puts the overall prevalence of visual impairment among children in Ethiopia at 7%, with the overall pooled prevalence of Addis Ababa being found to be 6%, which is a similar set up. (15) Our National Survey on Blindness and Low Vision in Ethiopia estimates that the overall prevalence of low vision 3.7%, (10) although this study was not specific to preschool children. The prevalence from this study is less than a study done at 2 primary schools in Addis Ababa which found it to be at 5.8%, however this study included children from 5-16 years which was out of the age range of this study. Another study done in Kola-Deba which included both preschool and school age children showing a prevalence of around 7.6%.(24, 26) This increased prevalence in such rural countries could be explained by the expected less awareness and less availability of health facilities in comparison to the capital city of Ethiopia. Another preschool screening in Asia showed that the presenting VA was decreased in 4.2% of Asian children alone and around 3.6% in the non-Hispanic white children. This lower prevalence in the more developed countries is not that surprising even so that the overall estimated prevalence of VI in USA was 1.5%.

Based on the correlational analysis of Age this study showed that there was almost no relationship between age and visual impairment which may be due to the fact that in this study was specific to a certain age group which was between 3 and 6 years old therefore the association between age and reduction of visual acuity may not be seen clearly.

One of the significant association found in this study was the association of maternal alcohol consumption during pregnancy and visual impairment which was found to be 8.5 times more likely than those mothers who denied taking any alcohol during pregnancy. A total of18 mothers admitted to taking any alcohol during pregnancy and this is not surprising as in nelson it is mentioned that this occurrence of consumption during pregnancy is as common as 1 in10 pregnant women (12). A similar study done in Bahir dar, Ethiopia has also found significant association between maternal alcohol consumption and visual impairment on bivariate analysis but was no deemed to be significant on the subsequent multivariate analysis.(27) Alcohol is a well-recognized teratogen that can affect the Central nervous system even irreversibly as it

affects any stage of the brain development leading to dysfunctions ranging from mild to severe (12). Fetal alcohol syndrome therefore is bound to have effect on the visual development and vision. This was demonstrated in one study which stated that Children with fetal alcohol syndrome (FAS) may have impaired vision and various ocular abnormalities, as any parts of the eye may be affected and anomalies such as microphthalmia, microcornea, cataract and many more may occur. Refractive errors and strabismus were also found to be common.(28) This study also demonstrated exactly this as 30 Children suffering from the fetal alcohol syndrome (FAS) were in comparison with 22 matched controls in regards to malformations of the eyes and the visual function and showed that abnormalities of the outer eye region, or intraocular abnormalities, or both, were found in 90% of the children which was significantly higher than the control group.(28)

There was a weak negative correlation regarding the TV viewing distance in this study suggesting a slight tendency for visual impairment to decrease as the distance from the TV increases. But a study done in Malaysia suggested that there was a significant association between distance of watching television and prevalence of impaired visual acuity.(29) However similarly to that study there was almost no relationship between the duration of TV exposure and visual impairment in this study as well. On the contrary to both these findings a study done on school age children here in Addis Ababa showed watching television for 2–4 hours/day on average were 3.6 times more likely to develop visual impairment as compared to those watching less than that.(30)

Of the main risk factors associated with an increased risk of developing amblyopia include Prematurity, having a first-degree relative with amblyopia. (22) In this study a weak negative correlation was found suggesting a slight tendency for visual impairment to decrease with increased gestational age. Regarding family history also there was on the Bivariate analysis to the development of visual impairment.(although this association was not significant in the multivariate analysis) this association was also seen in one study as children of parents with visual impairment were more likely to have visual impairment. (15)

In this study the independent variable with the strongest correlation with visual impairment is Visual acuity, and this is in line with other studies as the commonest causes of visual impairment in preschool children residing in the United States were attributed due to uncorrected refractive

error (69%). (17) This finding was backed also by a similar outcome found as Seventy percent of all decreased VA in Asian and non-Hispanic white preschool children is attributed to refractive error which was either due to an uncorrected refractive error or amblyopia resulting from refractive error. (21) A school age children (above 6 years) also showed that highest cause was found to be refractive error accounting for 70.27%. (5)

# 7. Strength and Limitations

The study has showed that visual Impairment is prevalent in pre-school children by providing basic screening techniques and provided ophthalmological consultation for those who were found to have any abnormality during the screening process.

Physical examination was Conducted by optometrist and the fact that it is the first study in Addis Ababa preschool children age group makes it important.

The Assessment of visual impairment was done only with visual acuity, which did not include visual field testing. There is also an issue of recall bias as the parents had to recall antenatal and perinatal history.

The parents of children with any indication during the initial screening were notified of the indication for ophthalmologist evaluation and offered free evaluation at a hospital but due to different reasons and issues only one fifth came for evaluation.

# 8. Conclusion and Recommendation

## Conclusion

The prevalence of visual impairment among preschool-age children residing in Addis Ababa was **5.24%** which is slightly lower than other studies done. Although there is no study done on this specific age groups (preschool age). It has shown that screening at this age as per the recommendations of the AAP can be beneficial with many of the visual impairments being due to either preventable or treatable causes, early detection or correction of the visual problem at an early age is bound to have educational and behavioral benefits.

## Recommendation

**Clinical Implications**: Visual acuity is a fundamental measure of eye health, assessing how well a person can see the details of a letter or symbol from a specific distance. The strong correlation with visual impairment underscores the importance of visual acuity tests in diagnosing and monitoring eye health conditions.

**Preventive and Therapeutic Strategies**: Understanding the correlation between visual acuity and visual impairment can guide preventive measures, early interventions, and treatment strategies to mitigate the risk of visual impairment. For instance, regular eye examinations can detect changes in visual acuity early, allowing for timely intervention.

**Research and Policy**: These findings can inform research on eye health, guiding studies on the causes of visual impairment and the effectiveness of various interventions. Additionally, policymakers can use this information to allocate resources and design programs aimed at preventing visual impairment, especially in populations at higher risk due to poor visual acuity.

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# Annex

## የመረጃ ቅፅ እና የተሳታፊዎች ፈቃደኝነት ማረጋገጫ

ጤና ይስጥልኝ ዶ/ር ኪሩቤል አስመላሽ እባላለሁ፡፡ በህፃናት ላይ ስለሚከሰት የእይታ መዛባት እና ተያያዥነት ስላላቸው ምክንያቶች በተለያዩ አዲስ አበባ ውስጥ በሚገኙ የመዋለ-ህፃናት ት/ቤች መረጃ በመሰብሰብ ላይ ነኝ፡፡ እርሶም በዚህ ጥናት ለመሳተፍ ከተስማሙ ከላይ በተጠቀሰው ርዕስ ላይ መሰረታዊ የሆኑ ጥያቄዎችን ይጠየቃሉ በተጨማሪም ልጅዎ የርቀት የአይን ምርመራ ያካሂዳል ፡፡ መጠይቁም ከ 10 እስከ 15 ደቂቃ ብቻ የሚፈጅ ሲሆን የእርሶ ትክክለኛ ምላሽ ለጥናቱ ትልቅ አስተዋፆ እንዳለው እናሳውቃለን፡፡ ይህ ጥናት በተሳታፊዎች ላይ ምንም አይነት አካለዊ ጉዳት የማያስከትል ነው፡፡ በዚህ ጥናት ላይ የተሳታፊው ማንነት የማይገለፅ ሲሆን የሚሰጠው መረጃም ምስጢርነቱ የተጠበቀ ነው፡፡

ከላይ በተጠቀሰው ርዕስ ዙሪያ ለሚደረግሎት ቃለ መጠይቅ እና ለልጅዎን እይታ ለመረዳት ለምናደርገው የርቀት የአይን ምርመራ ፈቃደኛ ከሆኑ ከታች በተቀመጠው ክፍት ቦታ ፊርማዎትን ያስቀምጡ

የተሳታፊው ፊርማ ____________________

ስለተሳትፎ እናመሰግናለን፡፡

# Consent Form

Hello there, I am Dr. Kirubel Asmelash I am collecting data regarding prevalence and associated factors of visual impairment among preschool children in selected schools located in Addis Ababa using structured questionnaires and visual acuity test conducted on your child to test for visual impairment that will be collected by trained data collectors. It will take 10 to 15 minutes of your time. Your honest response is very important to produce quality data in the organization there by to plan appropriate measures that could be taken. Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. You can ask for elaborations on questions you think you do not properly understand. There are no foreseeable (or expected) risks to you for participating in this study. There will be no direct benefit to you for your participation in this study. This study is anonymous. We will not be collecting or retaining any information about your identity. The records of this study will be kept strictly confidential.

CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I do also understand that there is no risk in participating in the study, so I voluntarily agree to take part in this study.

Participant's signature ______________________________ Date _____________

Thank you for spending your precious and valuable time

# Questionnaire Tool

The purpose of this data collection tool is to capture data regarding the prevalence and Associated factors of visual impairment among preschool children in selected schools located in Addis Ababa. This structured data collection tool will use data collected from students found in preschools by direct interview and doing the physical visual assessment. It will take 15 to 20 minutes and be collected by the data collectors. The tool has four sections assessing socio-demographic, childbirth history, family history, and physical examination section using a visual acuity test. It is very important to ensure the quality of data collected since it will be used to plan appropriate measures that could be taken.

Name of Health facility- _____________

Unique ID- _____________

Date of data collection-_____________

Name of data collector _____________

Name of supervisor-_____________

Data collection completeness: Not completed ☐ Completed ☐ Partially ☐

# Questionnaire

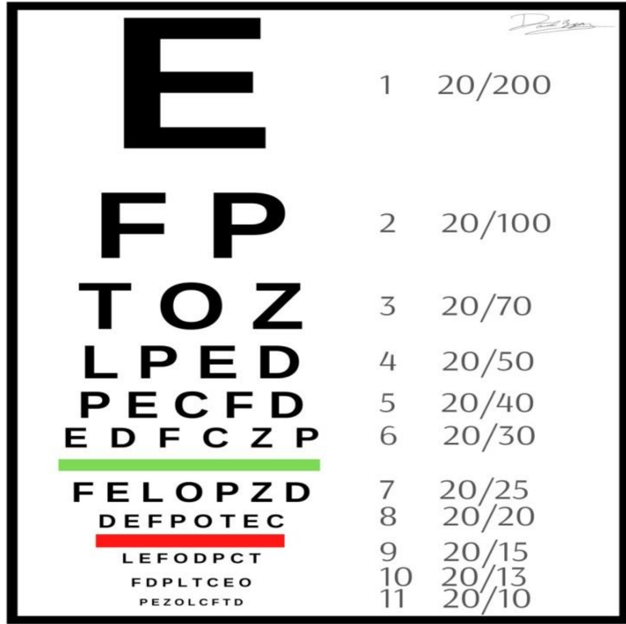
| Socio-demographic Characteristics | |
|---|---|
| **Age (In years)** | |
| **Sex** | 1. Male<br>2. Female |
| | |
| **Educational status of household head** | 1. Uneducated<br>2. Primary school<br>3. Secondary school<br>4. Diploma and above |
| **Educational level of the child** | 1. Kindergarten I<br>2. Kindergarten II<br>3. Kindergarten III |
| **Religion** | 1. Orthodox<br>2. Muslim<br>3. Protestant<br>4. Others |
| **Employment** | 1. Employed<br>2. unemployed |
| **Family monthly income, ETB** | 1. <2,000<br>2. 2,001–5,000<br>3. 5,001–10,000<br>4. 10,001–15,000<br>5. >15,000 |
| **Family size** | 1. <4<br>2. 4–6<br>3. >6 |

| **Behavioral Factors** | |
|---|---|
| **History of television exposure** | 1. Yes<br>2. No |
| **Duration of television exposure** | 1. <2 hours/day<br>2. 2–4 hours/day<br>3. >4 hours/day |
| **Television-exposure distance** | 1. <2 m<br>2. 2–4 m<br>3. >4 m |
| **Duration of mobile/computer** | 1. exposure<br>2. <2 hours/day<br>3. 2–4 hours/day<br>4. >4 hours/day |
| **Children's Birth History and medical History** | |
| **Gestational age** | 1. <37 weeks<br>2. ≥37 weeks |
| **Mode of delivery** | 1. SVD<br>2. Cesarean section |
| **Admission to NICU** | 1. Yes<br>2. No |
| **Previous O2 therapy** | 1. Yes<br>2. No |
| **Vaccination status** | 1. Fully vaccinated<br>2. Partially/Unvaccinated |

| | |
|---|---|
| **Medical visits** | 1. Yes<br>2. No |
| **Frequency of medical visits** | 1. Yearly<br>2. Symptoms seen and when traumatized |
| **History of trauma** | 1. Yes<br>2. No |
| **Maternal History During Pregnancy** | |
| **Maternal alcohol consumption during pregnancy** | 1. Yes<br>2. No |
| **Maternal cigarette smoking/exposure during pregnancy** | 1. Yes<br>2. No |
| **Systemic illness during pregnancy** | 1. Yes<br>2. No |
| **<u>Nutritional status</u>** | |
| **Exclusive breast-feeding** | 1. Yes<br>2. No |
| **Family history of ophthalmologic problems** | 1. Yes<br>2. No |
| **Self-report of eye problem** | 1. Yes<br>2. No |

| | |
|---|---|
| Does the child recognize faces and objects? | 1. Yes<br>2. No |
| Do the parents notice:<br><br>Abnormal head posturing? | 1. Yes<br>2. No |
| Squinting or blepharospasm | 1. Yes<br>2. No |
| Eye deviation | 1. Yes<br>2. No |
| Tearing OR Discharge | 1. Yes<br>2. No |
| **PHYSICAL EXAMINATION** | |
| Anthropometry | 1. MUAC < 12.5cm<br>2. MUAC > 12.5cm |
| **External eye examination** | |
| **Penlight evaluation of the lids, conjunctiva, sclera, cornea, and iris.**<br><br>Any Discharge Or color changes | 1. Yes<br>2. No |
| **Ptosis** | 1. Yes<br>2. No |
| **Ocular motility (H pattern)** | 1. Yes<br>2. No |

| **Pupillary response** | 1. Yes<br>2. No |
|---|---|
| **Simultaneous red reflex** | 1. Red reflex seen<br>2. Red reflex not visualized |
| **Corneal light reflex** | 1. Yes<br>2. No |
| **Ocular alignment (cover-uncover test)** | 1. Symmetrical<br>2. Asymmetrical |
| **<u>Monocular visual acuity</u>**<br><br>Snellen letters or Surrounded HOTV or LH symbols. | |



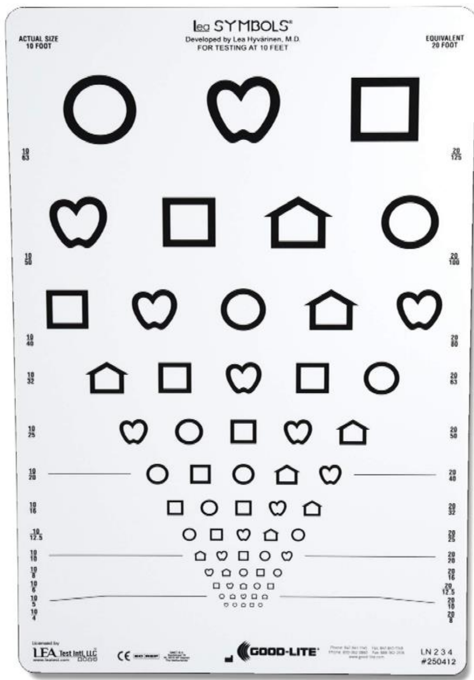




**Fig 4: -** *Snellen Acuity Chart ,HOTV Test (Matching Test)& LH Symbols (LEA Symbols) all of with are approved methods for screening children based on their age according to the AAP*(7)

## Ophthalmology Referral Indications (11)

- Positive history
- Abnormal examination (abnormal red reflex, pupillary asymmetry of ≥1 mm, unilateral ptosis)
- Eye preference
- Ocular alignment abnormalities
- Visual acuity worse than 20/40 for children 48 through 59 months or worse than 20/30 for children ≥60 months in 1 or both eyes
- Visual acuity difference of 2 or more lines between eyes

# APPROVAL SHEET

**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF MEDICINE DEPARTMENT OF PEDIATRICS AND CHILD HEALTH**

I as the undersigned Pediatrics and Child health resident declare that I have submitted my original thesis on the title Prevalence and associated factors of Visual Impairment among Preschool children In Selected Kindergartens in Addis Ababa, Ethiopia. Cross-Sectional study Prevalence and Associated factors of Visual Impairment among Preschool children in selected Kindergartens in Addis Ababa, Ethiopia in partial fulfillment of the specialty program.

**Submitted by:**

***Name of resident*** : Dr. Kirubel Asmelash

***Signature:________________________***

***Date:_____________________________***

***This proposed work has been submitted with my approval as an advisor,***

***Approved by:***

1. **Primary Advisor**: Dr. Hanna Gebre (Associate Professor of Pediatrics & Child Health)

**Signature : ____________________**

**Date**:__________________________

2. **Co-Advisor name**: Dr. Girum W/Gebriel Gesese (Associate Professor of Ophthalmology & glaucoma subspecialist)

**Signature:____________________**

**Date:__________________________**