

# Knowledge, Practice and Associated Factor of Trachoma Transmission and Prevention Among Primary School Students in Addis Zemen Town, South Gondar, Northwest Ethiopia

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## ABSTRACT

**BACKGROUND:** Trachoma is the leading infectious cause of blindness worldwide, particularly impacting the poorest nations, including Ethiopia.

**OBJECTIVE:** To assess knowledge, practice, and associated factors of trachoma transmission and prevention among primary school students in Addis Zemen town, South Gondar, Northwest Ethiopia, 2022.

**METHODS:** An institution-based cross-sectional study was conducted on 407 randomly selected primary school students (grades 5-8), aged 10 to 24 years. Data collection included face-to-face interviews using structured questionnaires and an observation checklist. Epi-data version 4.2.0.0 and SPSS version 20 were used to enter and analyze the collected data, respectively. The data were analyzed using the descriptive statistical method and using bivariable and multivariable logistic regression models. Variables with a *P*-value < .05 with a 95% CI were considered to have statistical significance.

**RESULT:** The study has a response rate of 98.25%, with a total of 400 respondents. 74.00% of the respondents knew about trachoma transmission and prevention, and 71.50% practiced preventive measures, such as face washing. Respondents in Grades 7 and 8, aged 12 to 24 years (AOR: 2.67, 95% CI: 1.93, 4.64), information about trachoma (AOR: 2.30, 95% CI: 1.56, 4.21), and urban residence (AOR: 3.42, 95% CI: 2.56, 5.23) were determinants of knowledge regarding trachoma transmission and prevention. Meanwhile, the mother's occupation (government employee) (AOR: 2.50, 95% CI: 1.83, 6.91) and overall knowledge about trachoma (AOR: 4.87, 95% CI: 2.95, 8.53) were significant predictors of the practice of trachoma transmission prevention.

**CONCLUSION:** While the level of knowledge and practice regarding trachoma transmission and prevention was relatively high, 26.00% of respondents still lacked adequate knowledge, and 28.50% did not practice prevention measures. To reduce the spread of trachoma and enhance public health outcomes, targeted interventions focusing on education about transmission and prevention strategies such as promoting face washing and proper sanitation should be prioritized in this area.

**KEYWORDS:** Knowledge, practice, student, trachoma, transmission

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## Introduction

Trachoma represents a substantial public health obstacle in numerous developing nations, Ethiopia among them. Trachoma, resulting from an ocular infection by *Chlamydia trachomatis*, stands out as a prominent concern, being the primary infectious cause of blindness worldwide.<sup>1</sup> This debilitating condition not only affects children's educational performance but also undermines their capacity to live healthy, fulfilling lives.<sup>2</sup> Trachoma impacts both children and adults, causing entropion, trichiasis, and conjunctival scarring, which typically appear in the second and third decades of life, with corneal opacity developing later.<sup>3</sup>

The World Health Organization's (WHO) Weekly Epidemiological Record reports that approximately 103 million people worldwide are at risk of developing active trachoma.<sup>4</sup> Trachoma accounts for a large proportion of deaths

and disability worldwide.<sup>1,5,6</sup> In Sub-Saharan Africa, trachoma is a significant public health issue, accounting for approximately 27% of the region's disability-adjusted life years (DALYs).<sup>7</sup> Trachoma is more prevalent and considered a disease of the dry environment in the Middle East, Southern Asia, and Africa. It disproportionately affects a notable portion of the population in regions where the disease is endemic, including Africa, India, and the Middle East.<sup>4</sup> A 2019 study in the Amhara region revealed that 28.3% of children still had active trachoma 3 to 5 years after implementing the SAFE strategy, which included Mass Drug Administration (MDA). Notably, the South Gondar zone contributed to 29.7% of the reported cases.<sup>8</sup>

To eliminate and control the disease, WHO designed a SAFE (Surgery, Antibiotics, Facial cleanliness, and



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Environmental improvement) strategy,<sup>9-11</sup> as a result, the burden of the disease ultimately reduced in the past years.<sup>8,9</sup> As of October 5, 2022, 15 countries have declared that they have successfully eliminated trachoma as a public health threat.<sup>12</sup> A study conducted in Viet Nam indicates that, under the SAFE strategy, maintaining proper face cleanliness (F) contributed to a 58.7% reduction in trachoma prevalence across all age groups, while environmental improvements (E) led to a 37.4% decrease in prevalence specifically among children.<sup>13</sup> Therefore, changes in hygiene behavior and improvements in environmental infrastructure are ideal long-term strategies for trachoma control.<sup>14</sup> Despite the progress made, the government and international organizations are working on new strategies to enhance environmental infrastructure. However, there are no current efforts to address or change hygiene behavior, which has been overlooked including our study area.

Besides, after the implementation of the reduction strategy for trachoma for many years, the disease is still prevalent in our study area among 35% of people, and it has remained hyper-endemic.<sup>15</sup>

Findings from various studies indicate that trachoma prevention and control practices among different groups, including mothers with children and adults, range between 45.5% and 64.4%, respectively.<sup>16,17</sup> This shows that a greater proportion of the community does not have appropriate knowledge and practice toward trachoma, and further studies are important to determine the exact figure and design an appropriate strategy. Several studies have identified various factors influencing knowledge and practices related to trachoma transmission. These factors include the mother's age, the husband's education, basic knowledge about trachoma, the mother's attitude toward it, participation in health education, time taken to reach a water source, water availability, and community-level factors like residence and types of water sources.<sup>16-21</sup>

Several studies have been conducted to assess the extent and severity of the disease in various study areas, along with efforts to evaluate the level of knowledge and practices related to trachoma transmission and prevention in other regions. To the best of our knowledge, no studies have been conducted in this study area. Therefore, we aimed to determine the level of knowledge, practice, and associated factors related to trachoma transmission and prevention among primary school students. Improving the knowledge and practice of primary school students is of paramount importance in protecting themselves from the disease as well as changing their family and community as a whole.

## Methods and Materials

### *Study design, area, and period*

The Institutional-based Cross-sectional observational design was conducted at 3 primary schools in Addis Zemen town, South Gondar, Northwest Ethiopia, from February 1 to May 1,

2022. Addis Zemen is a town in northern-central Ethiopia. Addis Zemen is located in the Amhara Region's South Gondar Zone, on the road connecting Gondar and Bahir Dar, with a latitude and longitude of 12°07' N and 37°47' E and an elevation of 1975 m above sea level. It is located in the northwest of Addis Ababa at 645 and 82 km from the capital city of the Amhara Region, Bahir Dar. Its total population is 52 683, and according to 2022 data from the Addis Zemen town administration office, the town has 8 kebeles (4 kebeles in the town and 4 kebeles from the surrounding rural areas) with 12 251 households. It has 1 primary hospital, 1 health care center, and 8 health posts. The climate is categorized as temperate highlands (Woinadega in amharic), which applies to areas with altitudes between 1500 and 2300 m, with this specific region being at 1975 m. The health services and water coverage in this area were generally inadequate, indicating that essential medical care and clean water resources were insufficiently and unevenly available and accessible to the population (source: Lebo Kemkem Woreda Health Office).

### *Source and study population*

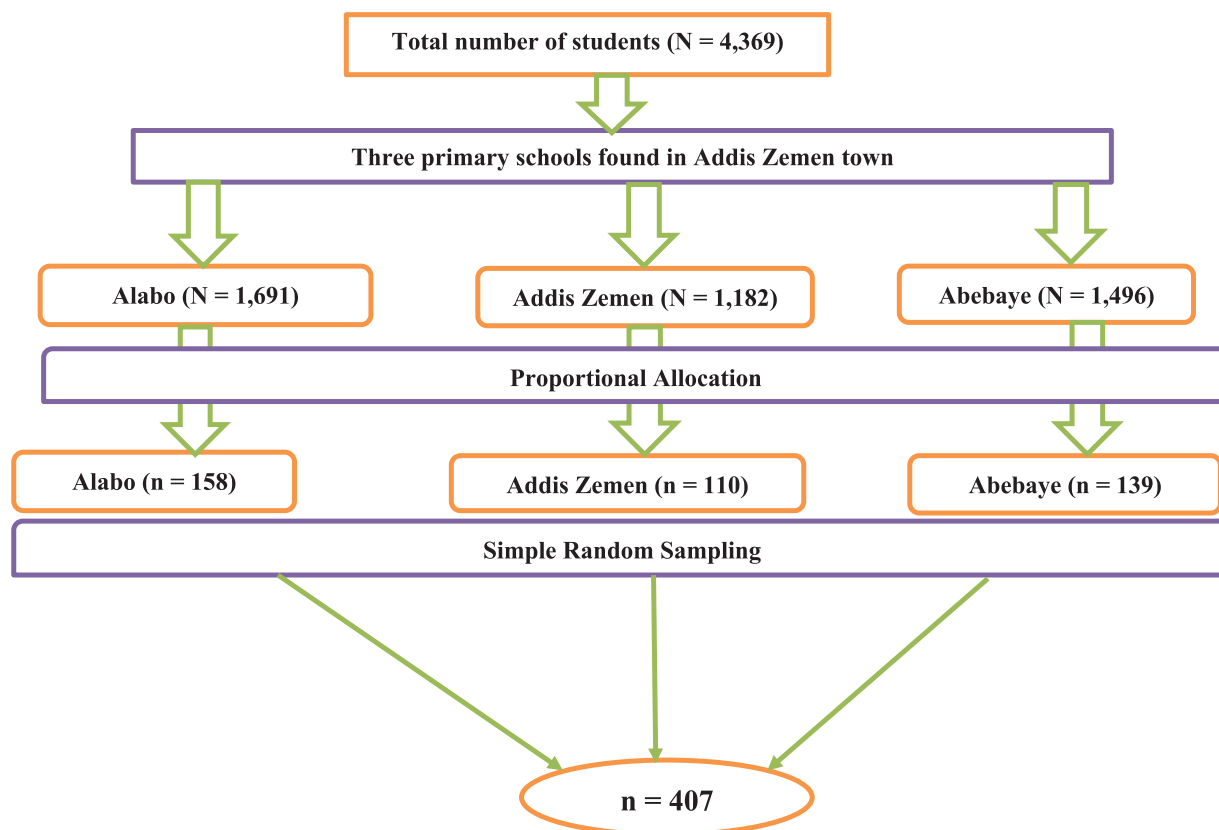
All students registered in primary schools in Addis Zemen town in the 2021 to 2022 academic year were a source population. All students attending grades 5 to 8, aged 10 to 24 years in selected schools in Addis Zemen town during the 2021 to 2022 academic year were part of the study population.

### *Eligibility criteria*

All students from grades 5 to 8 (aged 10-24 years) from selected public primary schools who were registered and attending class during data collection were included in the study. Students with speech and hearing impairments, learning disabilities, and those taking night and distance classes were excluded from the study.

### *Study variables*

The dependent variable in the study is knowledge and practices related to trachoma. Sociodemographic factors include sex, age, ethnicity, religion, grade, residence, parents' educational status, family size, and average monthly income. Environmental and personal hygiene factors include participation in the school hygiene and sanitation club, use of soap for personal hygiene, the availability and use of latrines, the practice and frequency of cleaning latrines, and water availability at school. Knowledge about trachoma encompasses the availability, source, and type of information, as well as understanding its nature, causes, symptoms, effects, target groups, and connections to flies, animals, livestock, and prevention methods. Practices related to trachoma involve the time and frequency of hand washing, face washing routines, history of family infections, responses to experiencing the disease, and actions taken upon infection.



**Figure 1.** A schematic representation of the sampling procedure for determining the knowledge, practice, and associated factors toward trachoma transmission and prevention among primary school students, Addis Zemen town, Northwest Ethiopia, 2022.

*Operational definition*

*Knowledge.* A set of 13 questions was formulated to evaluate knowledge. Participants receive a score of 1 for correct answers and 0 for incorrect ones. The total score across all 13 questions is calculated. Individuals scoring at or above the mean are classified as having “good knowledge,” while those scoring below the mean are classified as having “poor knowledge.”<sup>22</sup>

*Practice.* Ten questions were used to evaluate practice. Respondents receive a score of 1 for correct answers and 0 for incorrect ones. The sum of scores for all 10 questions is calculated. Those who score at or above the mean are categorized as having “good practice,” while those who score below the mean are categorized as having “poor practice.”<sup>16</sup>

*Illiterate.* A respondent who cannot read and write at a functional level, as assessed by the standardized literacy test or educational attainment record.<sup>23</sup>

*Sample size determination*

The sample size was determined by using the single population proportion formula, following assumptions: prevalence as 59.6% (0.596),<sup>22</sup>  $q = 1 - p$ , margin of error ( $d$ ) = 0.05,  $Z_{\alpha/2} = 1.96$ , corresponding to a 95% confidence level.<sup>24</sup>

$$n = \frac{(z_{\alpha / 2})^2 \times P(1 - P)}{d^2} = 370$$

With a 10% nonresponse rate, the total sample size will be 407. Here, ( $P$ ) represents the proportion of people with trachoma, ( $q$ ) denotes the proportion without trachoma, ( $d$ ) refers to the margin of error and the interval is set at 95% confidence.

*Sampling technique and procedures*

Initially, updated rosters of primary school students in grades 5 to 8 were obtained from the Addis Zemen town administration’s Education office and verified by school officials. Addis Zemen town comprises 3 public primary schools, from which a sufficient number of samples were selected by stratifying students within each school and assigning sample sizes using a proportional allocation method. Subsequently, 407 primary school students meeting the eligibility criteria were chosen through simple random sampling specifically the table of random numbers (see Figure 1).

*Data collection tools and procedure*

Data on sociodemographic, environmental/personal hygiene, knowledge, and practice aspects were gathered using a

pretested structured questionnaire, which was developed based on a review of relevant literature.<sup>16-21</sup> The questionnaire consisted of 4 main sections (see the Supplemental Material section). Part I focused on the sociodemographic profile of the respondents and comprised 12 items. Part II covered environmental and personal hygiene characteristics, including 8 items. Part III involved measuring the respondents' knowledge regarding trachoma transmission and prevention, containing 13 items. Part IV assessed the respondents' practices concerning trachoma transmission and prevention, comprising 10 items. To assess the adherence of primary school students to practices aimed at preventing trachoma transmission, we employed a checklist that included variables such as facial cleanliness, hand hygiene, materials used for washing hands and faces, and the frequency and timing of these washing practices. This approach enhances the accuracy and credibility of our study by providing a comprehensive evaluation of the students' hygiene behaviors. To ensure question consistency, the questionnaire was translated from English to Amharic (the local language) and then back to English, followed by a review by professional experts.

To validate the tool's dependability and validity, a pre-test was conducted among 20 respondents from a nearby public primary school in Woreta town. The questionnaire demonstrated acceptable reliability, with a Cronbach's alpha value of .76, surpassing the acceptable threshold of .60.<sup>25</sup> Therefore, the questionnaire's reliability in this study was deemed satisfactory.

#### *Data processing and analysis*

After data cleaning to ensure accuracy, comprehensiveness, consistency, and absence of missing values, the data was manually coded and entered into Epi Data version 4.2.0.0. Subsequently, it was exported to SPSS version 20 for analysis. Descriptive statistics, including mean, standard deviation, frequencies, and proportions, were computed for numerical values to characterize the study population along with dependent and independent variables. Variables showing potential association ( $P < .25$ ) in the bivariate binary logistic regression analysis were considered for inclusion in the multivariable analysis.<sup>26</sup> Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were estimated. Variables with  $P < .05$  were deemed statistically significant predictor variables. The model's fitness was evaluated using the Hosmer-Lemeshow test, with a  $P$ -value of .61 indicating a good fit ( $P > .05$ ). Furthermore, a check for multicollinearity between variables was conducted explicitly using the variance inflation factor (VIF), revealing no detected correlation between variables. The analysis was conducted by coding respondents' knowledge and practices related to trachoma transmission and prevention. Knowledge was coded as 0 for poor and 1 for good, while practice was similarly coded as 0 for poor and 1 for good. In multiple logistic regression, categorical variables with multiple responses are transformed into

binary dummy variables, with each category having its dummy variable and 1 category serving as the reference group. This approach enables the model to evaluate the effect of each category on the outcome while accounting for other variables.

#### *Ethical consideration*

This study received approval from the Ethical Review Committee (ERC) of Debre Markos University, College of Medicine and Health Sciences, Department of Environmental Health Science (Approval Number: HSC/R/C/Ser/No/357/14). The ERC is composed of senior researchers from each departments found in College of Medicine and Health Sciences and operates in accordance with international and national ethical guidelines for research involving human subjects, ensuring the protection of participants' rights, safety, and well-being. Permissions were also secured from the district administrative office and the school administrators. The study's purpose and procedures were explained to all participants, and verbal consent was obtained from eligible children prior to their participation. The research adhered to the ethical principles outlined in the Declaration of Helsinki and other relevant standards for studies involving human subjects.

#### **Results**

A total of 400 completed questionnaires were collected and analyzed, resulting in a response rate of 98.25%.

#### *Socio-demographic characteristics*

The participant demographic breakdown reveals that the majority were female, accounting for 215 individuals (53.80%). Nearly all participants, 399 (99.80%), identified as Amhara ethnicity. The age distribution shows that most participants fell within the 13 to 16 age range, comprising 224 individuals (56.00%), with a mean age of 13.27 years ( $\pm 2.16$ ). The largest portion of students, 247 (61.75%), were in grades 7 to 8 (aged 12-24 years), and the predominant religious affiliation was Orthodox Christianity, with 365 participants (91.30%). In terms of parental education, 123 mothers (30.80%) and 93 fathers (23.00%) were illiterate. The majority of respondents, 318 (79.50%), hailed from urban areas. Additionally, 290 participants (72.50%) came from families with fewer than 6 members, and over half, 204 (51.00%), belonged to families earning less than 3000 ETB per month (refer to Table 1).

#### *Environmental factors*

More than half of the respondents, 228 (57.00%), actively participated in school hygiene and sanitation clubs. The majority, 318 (79.50%), reported having access to soap for personal hygiene and washing clothes. Additionally, more than three-quarters, 322 (80.50%), stated that they had a latrine at home, with traditional pit latrines being the most common type (220

**Table 1.** Socio-demographic characteristics of respondents in Addis Zemen town, South Gondar, Northwest Ethiopia, 2022 (n=400).

VARIABLES	CATEGORY	FREQUENCY	PERCENT (%)
Sex	Male	185	46.20
	Female	215	53.80
Age	<13	148	37.00
	13-16	224	56.00
	>17	28	7.00
Religion	Orthodox	365	91.30
	Muslim	30	7.50
	Protestant	4	1.00
	Catholic	1	0.20
Ethnicity	Amhara	399	99.80
	Tigre	1	0.20
Grade	Grade 5-6 (aged 10-20y)	153	38.25
	Grade 7-8 (aged 12-24y)	247	61.75
Residence	Rural	82	20.50
	Urban	318	79.50
Mothers educational status	Illiterate	123	30.80
	Complete secondary (9-12) and lower level	209	52.20
	Certificate and above	68	17.00
Mothers occupation	Housewife	168	42.00
	Farmers	73	18.25
	Daily worker	43	10.75
	Government employee	116	29.00
Fathers educational status	Illiterate	92	23.00
	Complete secondary (9-12) and lower level	246	61.50
	Certificate and above	62	15.50
Fathers occupation	Trader	125	31.30
	Farmer	123	30.80
	Daily laborer	47	11.60
	Government employee	93	23.30
	Others	12	3.00
Family monthly income (ETB)	<3000	204	51.00
	3000-5000	121	30.20
	≥5000	75	18.80
Family size	<6	290	72.50
	≥6	110	27.50

Abbreviations: ETB, Ethiopian Birr (1 ETB = 0.03\$, on April 26, 2022).



**Table 2.** Environmental factors of trachoma in Addis Zemen town, South Gondar, Northwest Ethiopia, 2022 (n=400).

VARIABLES	CATEGORIES	FREQUENCY	PERCENT (%)
Do you participate in the school hygiene and sanitation club	Yes	228	57.00
	No	172	43.00
Do you have soap for personal hygiene & washing clothes whenever there is a need	Yes	318	79.50
	No	82	20.50
Do you have a latrine in your household	Yes	322	80.50
	No	78	19.50
If yes, what type of latrine do you have (n=322)	Pit latrine without superstructure	56	17.40
	Pit latrine with a superstructure	164	50.90
	VIP	67	20.80
	Flush toilet	35	10.90
Do you use a latrine in a household (n=322)	Yes	259	80.40
	No	63	19.60
Is your latrine cleaned on a regular basis? (n=322)	Yes	197	61.10
	No	125	38.90
If you say yes, how often the latrines are cleaned? (n=197)	Every day	49	24.80
	On every second day	37	18.80
	On every third day	42	21.40
	Once a week	69	35.00
Is there an adequate water facility at the school	Yes	149	37.30
	No	251	62.70

individuals, 68.30%), followed by VIP latrines (67 individuals, 20.80%). Among the respondents, 333 (83.30%) reported using latrines at home, and nearly three-quarters, 297 (74.30%), mentioned cleaning their toilets regularly. However, two-thirds of the respondents, 251 (62.80%), lacked access to a water facility at school (refer to Table 2).

#### *Knowledge of trachoma transmission and prevention*

In this study, the mean value of knowledge of respondents regarding trachoma transmission and prevention was  $7 \pm 2.9$  SD. Three-fourths of the respondents, 296 (74.00%), had previously encountered information about trachoma through various means, with health extension workers being the primary source of information for a majority of them, 246 (79.60%). The types of information about trachoma most commonly heard by respondents were its transmission, reported by 55.50%, and antibiotic treatment, reported by 43.80%. Among the reported adverse effects of trachoma, the most frequently cited was dimming of sight, mentioned by 222 respondents (55.50%), followed by blindness, mentioned by 160 respondents (40.00%).

Trachoma symptoms recognized by respondents included red eyes (43.80%), itch, bulge, and discharge from the eyes (28.50%). Additionally, over half of the respondents, 204 (51.00%), correctly identified trachoma as contagious, and 220 (55.00%) acknowledged flies as potential transmitters of the infection. The majority of respondents, 281 (70.30%), indicated that not washing their faces regularly is a major cause of trachoma (refer to Table 3).

#### *Practice toward trachoma transmission and prevention*

In this study, the mean value of primary school students regarding their practices for preventing trachoma transmission was  $5 \pm 3.62$  SD. To evaluate the level of practice concerning trachoma transmission and prevention, 10 questions were administered. Among the respondents, 185 (46.30%) reported washing their hands before meals, and 76 (19.00%) reported doing so after using the toilet. A substantial majority, 309 (77.30%), claimed to always wash their hands, and 345 (86.30%) were reported to regularly wash their faces with soap and water. The primary source of drinking water reported

**Table 3.** Knowledge levels of respondents on trachoma transmission and prevention in Addis Zemen town, South Gondar, Northwest Ethiopia, 2022 (n=400).

VARIABLES	CATEGORY	FREQUENCY	PERCENT (%)
Have you heard about trachoma	Yes	309	77.30
	No	91	22.70
If "Yes" where you heard (n=309)	Trachoma volunteers	39	12.60
	Health extension workers	189	61.10
	Mass media	71	23.00
	Others	10	3.30
What information did you hear about trachoma <sup>a</sup>	Cause of trachoma	160	51.77
	Transmission of trachoma	222	71.80
	Latrine construction and use	39	12.60
	Face washing	21	6.80
	Antibiotic treatment	175	56.60
	Others	114	36.70
Adverse effects of trachoma <sup>a</sup>	Blindness	160	40.00
	Sight gets dim	222	55.50
	No idea	39	9.80
	No adverse effect	21	5.30
Symptoms of trachoma <sup>a</sup>	Eye become red	175	43.80
	Itch, bulge, water run out from eyes	114	28.50
	Eye discharge	109	27.30
	I do not know	31	7.80
	Unclear sight when it becomes darker	99	24.80
Trachoma is contagious	Yes	204	51.00
	No	196	49.00
What makes a person to get trachoma <sup>a</sup>	Flies	220	55.00
	Dirty face	175	43.80
	Which craft	30	7.50
	Contact with a sick person	53	13.30
	Others	8	2.00
Causes of trachoma <sup>a</sup>	Do not wash your face regularly	281	70.30
	Do not take eye medicine	60	15.00
	Wash face with unclear water	107	26.80
	Share basin for washing	39	9.80
	Environmental pollution	66	16.50
	Do not eat enough	16	4.00
	Others	8	2.00

(Continued)

**Table 3.** (Continued)

VARIABLES	CATEGORY	FREQUENCY	PERCENT (%)
Who is most affected by trachoma <sup>a</sup>	Children under 10y	274	68.50
	Teenagers aged 13-18y	60	15.00
	Women	49	12.30
	Men	13	3.30
	Others	4	1.00
Is there a link between trachoma and flies	Yes	312	78.00
	No	88	21.80
Is there a link between trachoma and animal or livestock	Yes	156	39.00
	No	244	60.80
How can someone protect him or herself from trachoma <sup>a</sup>	Wash your face with clean water regularly	260	65.00
	Keep environmental cleanliness	122	9.50
	Surgery	38	14.50
	Take antibiotics or medicine	58	30.50
	Using pit latrine	54	13.50
	I do not know	17	4.30
Knowledge toward trachoma	Good	296	74.00
	Poor	104	26.00

<sup>a</sup>Because of the possibility of multiple responses the percentage does not sum up to 100%.

was piped water, cited by 131 individuals (32.80%), followed by boreholes, mentioned by 127 individuals (31.80%). In terms of healthcare facilities, 186 respondents (46.50%) mentioned visiting district hospitals, while 167 (41.80%) reported visiting health centers. Additionally, 93 respondents (23.30%) stated having a family member affected by trachoma. About 130 (32.50%) respondents reported that clinic officers or nurses are the first individuals they contact when they are sick with trachoma (refer to Table 4).

#### *Overall knowledge and practice level of respondents toward trachoma transmission and prevention*

In this study, both knowledge and practice regarding trachoma transmission and prevention among the respondents were assessed as vital components in combating the disease and achieving our elimination goals. Out of the total 400 respondents, 296 (74.00%) demonstrated good knowledge, while 286 (71.50%) exhibited good practice (refer to Figure 2a and b).

#### *Factors associated with respondent knowledge and practice toward trachoma transmission and prevention*

*Factors associated with respondent's knowledge of trachoma transmission and prevention.* The multivariable binary logistic regression analysis indicated that having information about trachoma, being in grades 7 to 8 (aged 12-24 years), and living

in an urban area is significantly positively associated with knowledge about trachoma transmission and prevention, with a *P*-value of less than .05. Specifically, concerning knowledge of trachoma transmission and prevention, primary school students from urban areas were more than 3 times as likely to have adequate knowledge compared to students from rural areas, with an adjusted odds ratio (AOR) of 3.42 and a 95% confidence interval (CI) ranging from 2.56 to 5.23 (see Table 5).

*Factors associated with respondent practice toward trachoma transmission and prevention.* The multivariable binary logistic regression analysis revealed that having a government-employed mother and better knowledge of trachoma transmission and prevention was significantly positively associated with practices toward trachoma transmission and prevention, with a *P*-value of  $\leq .05$ . Specifically, in terms of practice toward trachoma transmission and prevention, respondents with good knowledge were nearly 5 times more likely to practice effectively compared to those with poor knowledge, with an adjusted odds ratio (AOR) of 4.87 and a 95% confidence interval (CI) ranging from 2.95 to 8.53 (refer to Table 6).

## **Discussion**

The current study found that 74.00% of participants (296 individuals) had knowledge about trachoma. This proportion of knowledge concerning trachoma transmission and prevention



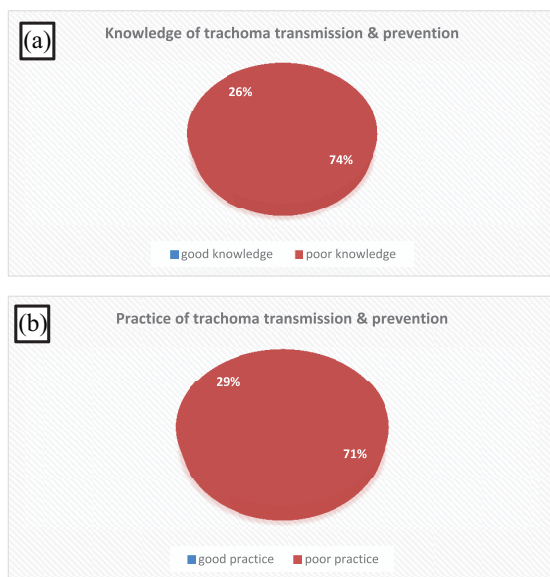
**Table 4.** Practice level of students toward transmission and prevention of trachoma in Addis Zemen town, South Gondar, Northwest, Ethiopia, 2022 (n=400).

VARIABLES	CATEGORY	FREQUENCY	PERCENT (%)
How often do you wash your hand	Always	309	77.30
	Sometimes	42	10.50
	Occasionally	49	12.20
When do you wash your hands <sup>a</sup>	Before meal	185	46.30
	After working	163	40.75
	After going to the latrine	76	19.00
	Before cooking	93	23.25
	After touching the waste matter	108	27.00
Do you wash your face regularly	Yes	345	86.20
	No	55	13.80
If yes, what did you use to wash your face (N=345)	Water only	118	34.20
	Soap and water	227	65.80
How many times do you wash your face in a day (N=345)	Once	161	46.70
	Twice	102	29.50
	Three	51	14.80
	>3	31	9.00
Have your family member affected by trachoma	Yes	93	23.20
	No	307	76.80
What do you do if you are infected with trachoma	Go to the health facility	279	69.80
	Buy drugs to treat the disease by myself	36	9.00
	Go to traditional healers (Tsebel)	38	9.50
	I will do nothing	47	11.70
Who do you contact first when you are sick with Trachoma	Medical doctor	27	6.70
	Community health worker	104	26.00
	Clinic officer/nurse at the clinic	130	32.50
	Eye Specialist	126	31.50
	Traditional healer	13	3.30
How long do you take to walk to the nearest health care center in search of clinical attention (N=279)	<30 min	101	36.30
	30 min to 1 h	89	31.90
	<2h	50	17.90
	>2h	39	13.90
Do you encounter any problems in seeking healthcare	Yes	131	32.80
	No	269	67.20

<sup>a</sup>Because of the possibility of multiple responses the percentage does not sum up to 100%.

aligns closely with findings from Kajiado, Kenya, where it was reported to be 71.00%.<sup>23</sup> One potential explanation could be

the prevalence of government healthcare facilities in the community, which are widely recognized and utilized, possibly due



**Figure 2.** (a) The overall level of knowledge of respondents toward trachoma transmission and prevention and (b) practice of respondents toward trachoma transmission and prevention in Addis Zemen town, South Gondar, Northwest Ethiopia, 2022 (n=400).

to the perceived affordability of healthcare services.<sup>27,28</sup> Conversely, the proportion of knowledge in the current study surpasses that reported in Vietnam for both the causes of trachoma and prevention methods, which stood at 61.10% for females and 69.45% for males.<sup>29</sup> The higher proportion of primary school students' knowledge about trachoma transmission and prevention in Ethiopia compared to Vietnam may be attributed to Ethiopia's longstanding public health campaigns targeting neglected tropical diseases, including trachoma. Ethiopia has been a focal country for international trachoma elimination efforts, with widespread community-based interventions, health education, and school-based hygiene promotion programs. Additionally, Ethiopia's high burden of trachoma has driven more intensive awareness campaigns, particularly in rural areas, where schoolchildren are often at greater risk. These sustained efforts have likely increased awareness and knowledge among students compared to Vietnam, where trachoma is less prevalent and public health efforts may be less focused on the disease.

The odds of having good knowledge about trachoma transmission and prevention among students in grades 7 to 8 (aged

**Table 5.** Factors associated with knowledge toward trachoma transmission and prevention, Addis Zemen town, South Gondar, Northwest, Ethiopia, 2022 (n=400).

VARIABLES	GOOD KNOWLEDGE	POOR KNOWLEDGE	COR (95% CI)	AOR (95% CI)
<b>Sex</b>				
Male	93	92	1	1
Female	95	120	1.27 (1.21, 5.63)	0.95 (0.87, 2.34)
<b>Grade</b>				
Grade 5-6	91	62	1	1
Grade 7-8	94	153	3.03 (2.87, 6.98)	2.67 (1.93, 4.64)**
<b>Residence</b>				
Rural	64	18	1	1
Urban	123	195	5.01 (2.97, 7.43)	3.42 (2.56, 5.23)***
<b>Information about trachoma</b>				
Yes	176	133	2.83 (1.78, 4.21)	2.30 (1.56, 4.21)**
No	29	62	1	1
<b>Family size</b>				
<6	132	158	1	1
≥6	35	75	1.79 (1.34, 4.23)	2.30 (0.76, 3.98)
<b>Mothers educational status</b>				
Illiterate	27	96	1	1
Secondary (9-12) and lower level	112	97	0.24 (0.19, 0.75)	0.67 (0.59, 2.34)
Diploma and above	34	34	0.28 (0.22, 0.84)	0.89 (0.45, 1.75)

Abbreviations: AOR, adjusted odd ratio; CI, confidence interval; COR, crude odd ratio.  
\*\*\* $P < .001$ . \*\* $P < .01$ .

**Table 6.** Factors associated with practice toward trachoma transmission and prevention in Addis Zemen town, South Gondar, Northwest Ethiopia, 2022 (n=400).

VARIABLES	GOOD PRACTICE	POOR PRACTICE	COR (95% CI)	AOR (95% CI)
<b>Grade</b>				
Grade 5-6	48	105	1	1
Grade 7-8	97	150	0.83 (0.43, 2.98)	0.67 (0.53, 4.64)
<b>Residence</b>				
Rural	50	32	1	1
Urban	120	198	2.57 (1.97, 7.43)	1.42 (0.96, 3.23)
<b>Family size</b>				
<6	103	187	1	1
≥6	36	74	1.13 (0.65, 4.23)	2.7 (0.83, 5.28)
<b>Mothers occupation</b>				
Housewife	62	106	1	1
Farmer	27	46	2.41 (1.41, 4.10)	1.67 (0.59, 2.34)
Daily laborer	19	24	0.82 (0.39, 1.72)	1.34 (0.65, 3.75)
Government employee	78	38	3.01 (2.39, 9.59)	2.50 (1.83, 6.91)**
<b>Knowledge of trachoma transmission and prevention</b>				
Poor	31	73	1	1
Good	205	91	5.20 (3.42, 8.96)	4.87 (2.95, 8.53)***

Abbreviations: AOR, adjusted odd ratio; CI, confidence interval; COR, crude odd ratio.  
 \*\*\* $P < .001$ . \*\* $P < .01$ .

12-24 years) were 2.67 times higher (adjusted odds ratio: 2.67; 95% confidence interval: 1.93, 4.64) compared to students in grades 5 to 6 (aged 10-20 years). This finding may be attributed to the fact that students in higher grades typically possess more advanced knowledge due to their progression in education. Additionally, students in grades 7 to 8 are often at an age where they are more conscious of personal hygiene, especially as they enter puberty, which is a period when individuals typically begin to prioritize their appearance and cleanliness. This increased awareness of personal hygiene may lead them to adhere more closely to basic trachoma preventive practices.

The odds of possessing good knowledge regarding trachoma transmission and prevention were 3.42 times higher among urban children compared to rural children, with a confidence interval of 2.56 to 5.23. This difference can be attributed to varying access to health information, with rural residents often facing greater challenges in obtaining health information compared to their urban counterparts. Rural areas often have limited access to media outlets such as radio and television, as well as fewer interactions with health professionals like doctors. This restricted access compared to urban areas results in lower trachoma knowledge among rural residents. These factors impede rural residents' ability to learn about trachoma and its prevention.

The odds of possessing good knowledge regarding trachoma transmission and prevention were 2.30 times higher among children who had access to information about trachoma compared to those who did not, with an adjusted odds ratio (AOR) of 2.30 and a 95% confidence interval (CI) ranging from 1.56 to 4.21. This finding underscores the notable impact of access to information on knowledge acquisition. Access to information enables individuals to direct their attention toward relevant topics and expand their understanding. With access to information on subjects of interest, individuals can develop new skills, gain insights into different cultures, and broaden their perspectives. Therefore, providing accessible and accurate information about trachoma transmission and prevention can play a crucial role in enhancing knowledge levels and promoting preventive practices among children.<sup>30</sup>

The current study assessed compliance with trachoma prevention practices using a combination of survey questions and an observational checklist designed to evaluate adherence to reported behaviors. The findings revealed no meaningful discrepancies between the 2 assessment methods. Compliance with preventive practices for trachoma was found to be 71.50%, which is higher than previous findings in Vietnam (54.72%),<sup>29</sup> Andabet district (49.84),<sup>22</sup> Rural Lemo District (59.60%),<sup>21</sup> rural districts of

Oromia (51.50%),<sup>16</sup> Minia University Hospital (41.70%).<sup>31</sup> This discrepancy might be due to the variation in settings and study populations. The current study measured the practice of trachoma preventive measures among school-aged children themselves, while in previous studies, the practice of trachoma preventive measures was computed from their mothers or caretakers.

The odds of engaging in preventive practices were 2.50 times higher among children whose mothers were government employees by occupation compared to those whose mothers were housewives, with an adjusted odds ratio (AOR) of 2.50 and a 95% confidence interval (CI) ranging from 1.83 to 6.91. This finding suggests that maternal occupation plays a vital role in influencing children's preventive practices. Government-employed individuals typically have higher levels of education, which can lead to better understanding and awareness of preventive measures. Additionally, a higher level of education may facilitate the translation of knowledge and attitudes into tangible preventive actions. Therefore, children whose mothers are government employees may be more likely to adopt preventive practices due to the influence of their mothers' education and awareness.<sup>16</sup>

The odds of practicing trachoma preventive measures among study participants with good knowledge were 4.87 times higher than those among children with poor knowledge, with an adjusted odds ratio (AOR) of 4.87 and a 95% confidence interval (CI) ranging from 2.95 to 8.53. This finding is consistent with previous studies conducted in the Gamo Gofa zone of Ethiopia,<sup>32</sup> Tigray Region, Northern Ethiopia<sup>18</sup>, and rural districts of the Oromia Region,<sup>16</sup> which also reported a significant association between knowledge of trachoma and the practice of preventive strategies against trachoma. This indicates that awareness of contracting trachoma and its associated risks motivates individuals to adhere to basic preventive measures. Moreover, there is a correlation between knowledge and attitude, which subsequently influences the level of practice. Therefore, promoting knowledge about trachoma and its prevention is crucial for encouraging individuals to adopt effective preventive strategies.

### Strengths and Limitations of the Study

This study possesses several strengths and limitations that are important to acknowledge. One of the strengths is that it achieves a high response rate. One of the key strengths of this study is the inclusion of an observational checklist to assess the adherence of primary school students to trachoma prevention practices. This study has several limitations. One limitation of this study is its inability to accurately measure and report certain factors, such as the economic condition of households, since the respondents are primary school students aged between 10 and 24 years. Its cross-sectional design limits the ability to establish a temporal relationship between the outcome and predictor variables. Additionally, recall bias may have occurred, as participants might better remember more recent or severe events compared to older or less important ones. Social desirability bias is

another limitation, as primary school students may have provided responses they believed the research team preferred, such as overreporting their knowledge of trachoma or frequency of practicing prevention strategies. Furthermore, the exclusion of students with mental illnesses or hearing impairments, due to the lack of trained data collectors in sign language and the unavailability of psychiatric specialists, limits the generalizability of the findings and may introduce bias. Despite these limitations, the study offers valuable insights into the knowledge and practices surrounding trachoma transmission and prevention in the region, which can help guide future public health interventions and policy development.

### Conclusion

The study revealed that primary school students demonstrated a relatively high level of understanding and adherence to practices related to trachoma transmission and prevention, with knowledge at 74.00% and practice at 71.50%. Nevertheless, 104 students (26.00%) and 114 students (28.50%) still showed inadequate knowledge and practice, respectively. Factors such as grade level, residence, and access to information about trachoma were significantly associated with knowledge. Meanwhile, mothers' occupations and knowledge of trachoma emerged as significant predictors for practice. Interventions aimed at spreading information and educating people about trachoma transmission and prevention include promoting face washing, building latrines, and encouraging hand washing practices. Additionally, efforts to strengthen school sanitation and hygiene clubs play a pivotal role in creating avenues for conveying information about trachoma and other health-related issues to students. Implementing targeted interventions in schools that focus on health education, information dissemination, and promoting hygiene practices can greatly increase students' understanding of trachoma and encourage preventive measures. These initiatives not only reduce trachoma's impact but also create a lasting culture of health and hygiene among children, meaningfully boosting community well-being for generations to come.

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### Author Contributions

GY: contributed to the study design, data collection, data analysis, interpretations of the results, and manuscript write-up. ET: contributed to the data collection, data entry and analysis. All authors read and approved the final manuscript.

## Ethics Approval

All procedures involving human subjects were done in compliance with the Declaration of Helsinki.

## Informed Consent

For this study, we only obtained informed verbal consent from the study subjects because the study did not involve advanced data collection procedures such as specimen collection and so on. The data was gathered solely through interviews. For those whose age was <18 years, we obtained assent from the study subjects, and we obtained informed verbal consent through a phone call from their parents. The research and ethical review committee confirmed the ethical procedure followed for this study.

## Consent for Publication

Not applicable.

## Availability of Data and Materials

All data generated or analyzed during this study are included in this article. The data that support the findings of this study are also available from the corresponding author upon reasonable request.

## Supplemental Material

Supplemental material for this article is available online.

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