Clinical Ophthalmology

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ORIGINAL RESEARCH

High Prevalence of Clinically Active Trachoma and Its Associated Risk Factors Among Preschool-Aged Children in Arba Minch Health and Demographic Surveillance Site, Southern Ethiopia

This article was published in the following Dove Press journal:
Clinical Ophthalmology

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Background: Trachoma is the leading infectious cause of irreversible blindness. In areas where trachoma is endemic, active trachoma is common among preschool-aged children, with varying magnitude. There is a dearth of information on the prevalence of active trachoma among preschool-aged children (the most affected segment of the population).

Purpose: The study aimed to assess the prevalence of clinically active trachoma and its associated risk factors among preschool-aged children in Arba Minch Health and Demographic surveillance site, Southern Ethiopia.

Patients and Methods: A community-based cross-sectional study was conducted among 831 preschool-aged children from May 01 to June 16, 2019. A pre-tested and structured interviewer-administered Open Data Kit survey tool was used to collect data. The study participants were selected using a simple random sampling technique by allocating a proportion to each kebeles. Both bivariable and multivariable logistic regression analyses were performed to identify associated factors. The level of statistical significance was set at a p-value of less than 0.05 in multivariable logistic regression.

Results: The overall prevalence of clinically active trachoma among preschool-aged children was 17.8% with 95% CI (15%, 20%). Time taken to obtain water for greater than thirty minutes (AOR=2.8,95% CI: 1.62, 5.09), presence of animal pens in the living compound (AOR=5.1, 95% CI: 3.15, 8.33), improper solid waste disposal (AOR=7.8,95% CI: 4.68,13.26), improper latrine utilization (AOR=2.5, 95% CI: 1.63,3.94), a child with unclean face (AOR=3.5, 95% CI: 2.12,5.97) had higher odds of active trachoma.

Conclusion: The prevalence of clinically active trachoma among pre-school aged children was high. "Facial cleanliness" and "Environmental improvement" components of the SAFE strategy are vital components in working towards the 2020 target of eliminating trachoma. Therefore, stakeholders at different hierarchies need to exert continuing efforts to integrate the trachoma prevention and control programs with other public health programs, with water sanitation and hygiene programs and with the education system.

Keywords: preschool children, active trachoma, associated factor, Ethiopia

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Introduction

Trachoma is the leading infectious cause of irreversible blindness. It is characterized by repeated conjunctival infection with particular strains of *Chlamydia trachomatis*. Eventually, in some individuals, sight is lost from irreversible corneal

opacification.[1] The infection is transmitted by direct or indirect transfer of eye and nose discharges of infected people, particularly young children who harbor the principal reservoir of infection. These discharges can be spread by particular species of flies (*Musca sorbens)*.[2] According to World Health Organization (WHO), trachoma simplified grading system it is classified as trachomatous inflammation follicular (TF), trachomatous inflammation intense (TI), trachomatous scarring (TS), trachomatous trichiasis (TT), and corneal opacity (CO).[3,4]

The latest global estimate indicates that 158 million people live in trachoma-endemic areas and are at risk of trachoma blindness that needs interventions.[5] Today, 1.9 million people are blind or visually impaired due to trachoma.[6,7] More than 80% of the burden of active trachoma is concentrated in 14 countries in Sub-Saharan Africa, with Ethiopia being the country bearing the greatest burden.[5] More than 75 million people are at risk of developing trachoma in Ethiopia, the world's most affected country,[8] and contributing 49% of the global burden of active trachoma.[9] In Ethiopia, trachoma remains a major public health problem.[6,7,10,11] The Ethiopian National Survey on Blindness, Low Vision, and Trachoma, carried out from 2005 to 2006 estimated that the national prevalence of active trachoma was 40.14%, with some regional variation. It is estimated that more than 138,000 people in Ethiopia are blinded by trachoma.[12] In areas where trachoma is endemic, active (inflammatory) trachoma is extremely common among preschool-aged children, with prevalence rates that can be as high as 60–90%.[13]

In 1996, the World Health Organization launched the WHO Alliance for the Global Elimination of Trachoma (GET) by 2020. The Alliance is a partnership that supports the implementation of the SAFE (surgery, antibiotics, facial cleanliness, environmental improvement) strategy for elimination.[14] Given this public health tragedy, the Ethiopian government also signed the vision 2020 initiative in 2002, which is a 20 years strategic plan to eliminate trachoma.[15] After the implementation of the SAFE strategy in 2003, Ethiopia made remarkable achievements. However, many districts continue to have a high prevalence of active trachoma.[16] Since 2007, orbis and Irish aid along with other non-governmental organization and the regional health bureau is working towards a goal to eliminate blinding trachoma in the study area. The organization was tried to implement the SAFE strategy to prevent blinding trachoma.[17] The intervention mainly focuses on antibiotic distribution and trichiasis surgery. According to summative evaluation of the project under achievement were reported regarding "F" and "E" components of the SAFE strategy.[18] Despite their efforts to control and prevent trachoma, still it remains the public health concern in the study area.

There are several risk factors associated with an increased prevalence of trachoma. These include personal hygiene-related, environmental-related, over-crowdedness, socio-demographic, toilet facilities, accessibility of water, and health facilities related factors.[19–23] Most importantly, the prevalence and risk factors associated with trachoma tend to vary from one epidemiological setting to another, thus to meet the GET2020 targets and targets for global action in sustainable development goal (SDG) target 3.3, which calls to "end the epidemics of neglected tropical diseases" by 2030, as part of Goal 3 (Ensure healthy lives and ensure well-being for all at all ages).[24] It is important to understand the local distribution of the disease in a specific community and specific age groups. To the best of our knowledge, there was one study done in Ethiopia.[7] In line with the focus of reduction of active trachoma to a level, less than five percent among children aged between one and nine years in the current health sector transformation plan of the country[25] and the expected variation across regions of the country in the magnitude of active trachoma, the findings of this study is timely and would contribute to the local program planning and policymaking at large. Moreover, in response to the limited evidence in the prevalence of active trachoma among preschool children in the country in recent years and to fill this gap in the scientific literature, our study aimed to assess the prevalence of active trachoma and the factors associated with it in Arba Minch Health and Demographic Surveillance Site, Southern Ethiopia.

Methods and Materials

Study Setting, Design, and Population

A community-based cross-sectional study was conducted among preschool children (children aged 2–5 years) in Arba Minch – Health and Demographic Surveillance Site (AM-HDSS), Southern Ethiopia from May 01 to June 16, 2019. AM-HDSS is located in both Arba Minch Zuria and Gacho Baba districts. Ethiopia has established Health and Demographic Surveillance Systems (HDSS) at different corners of the country in order to contribute to filling the information gap to some extent. Currently, there are six

HDSS sites. One of the sites is AM-HDSS owned by Arba Minch University. The Ethiopian universities are networked to produce data which may reflect some pictures of the country related to health and demography. This network namely the "Ethiopian Universities Research Centers Network" was established in 2007. Arba Minch Zuria and Gacho Baba districts have a total of 31 kebeles (smallest administrative unit in Ethiopia) with three different climatic zones, high land, midland, and lowland, among which 9 kebeles are selected as a center for producing data to fill the country health information need. The report of AM-HDSS showed the surveillance site has a total population of 74,157. The total number of children aged between two and five years in AM-HDSS was 7289. Out of the children aged between two and five years; Male account 51.06% and female account 48.94%. All preschool aged children (2 to 5 years old), who lived in AM-HDSS for at least 6 months were included in the study.

Sample Size Estimation

The sample size was determined by using a single population proportion formula by considering 18% prevalence of active trachoma among preschool children taken from a study done in Dembia District, Northwest Ethiopia.[7] Ten percent nonresponse rates and 95% confidence level with 2.5% margin of error. Based on these assumptions, the final sample size calculated for this study was 907 children aged between 2 and 5 years.

Sampling Procedure

All Arba Minch – health and demographic surveillance site kebeles were included in this study because the kebeles are already selected as a center for producing data by the Arba Minch University. First, the total households (HHs) in each kebele with preschool children and lists of children aged between two and five years were obtained from the AM-HDSS coordination office. Then, the study participants were selected using a simple random sampling technique (computer-generated random numbers) after allocating a proportion to each AM-HDSS kebeles based on the size of preschool children. Only one study participant from each household was selected using lottery method in a household with two and above preschool children. When mother/caregiver–child pairs were not available at the time of data collection, two repeated visits were made.

Operational Definition

Active trachoma was measured as the presence of either Trachomatous inflammation follicles or intense. Unclean face: The presence of "sleep" or ocular discharge around the eyes, flies, or the presence of nasal discharge on the upper lip or cheeks of the child at the time of visit. Improper solid waste disposal; in this study, improper solid waste disposal was defined as not disposing solid waste at a legally unauthorized place or dumping wastes in the open field. Proper latrine utilization; proper latrine utilization was defined as households with either shared or private functional latrines and the family disposed the faeces of under-five children in a latrine, no observable faeces in the compound, no observable fresh faeces on the inner side of the squatting hole and the presence of clear foot-path to the latrine is uncovered with grasses or other barriers of walking otherwise it was defined as improper latrine utilization.[25]

Data Collection Procedure

A pretested and structured interviewer-administered Open Data Kit (ODK) survey tool was used to collect the socio-demographic, housing, environmental, personal hygiene-related characteristics, accessibility of health facilities, and trachoma-related characteristics of the participants (refer trachoma survey questionnaire, attached as Supplementary material). The tools were developed by reviewing different works of literature. Language experts translated the questionnaire from English to Amharic and back to English to ensure consistency in meaning. A pretest was conducted on unselected district by taking 5% of the total sample size. After we made appropriate corrections, the revised version of the questionnaire was used for final data collection. Five public health experts and 16-trained data collectors (six clinical optometrists and 10 data collectors who were AM-HDSS field workers (routinely collects HDSS data)) were recruited for supervision and data collection, respectively.

Clinical Assessment of Trachoma

Following the face-to-face interview for collecting data related to socio-demographic, hygiene, and environmental factors; trained clinical optometrists examined each child by ocular examination. The clinical optometrists performed a detailed ophthalmic examination with strict compliance with the standard methods and procedures. The clinical Optometrists carefully inspected eyelashes,

cornea, limbus, upper eyelid, and tarsal conjunctiva using a pen torch and binocular loupe that has 2.5× magnifying power to identify clinical signs of trachoma: trachomatous inflammation-intense (TI), trachomatous inflammation-follicular (TF), trachomatous conjunctival scar (TS), trachomatous trichiasis (TT), and corneal opacity (CO). Eyelid eversion (turning out) was done using an aseptic technique using alcohol used for hand disinfection. The interrater variability of eye examination was solved by expert trachoma graders. The guideline used for clinical diagnosis and reporting of eye examination results was the simplified trachoma grading system, which was developed by the WHO for fieldwork.[3,4] TF: the presence of five or more follicles in the upper tarsal conjunctiva; TI: when the tarsal conjunctiva red, rough, and thickened; TS: the presence of scarring (white lines, bands or sheets) in the tarsal conjunctiva; TT: the presence of at least one eyelash rubs on the eyeball; CO: if the pupil margin is a blurred view through the opacity.

Data Quality Management

Data collectors and supervisors were provided intensive training on the techniques of data collection and components of the instrument. Before the commencement of the data collection, a pretest was conducted. A standard tool, which was commented by many experts, was used to collect the information. The ODK survey tool that was very important to control the quality of data was used to collect data by using tablets. The Authors and supervisors critically checked the data for completeness before uploaded to the ODK cloud server.

Statistical Analysis

The collected data were downloaded from ODK aggregate and then converted to an excel file. It was then edited and cleaned for inconsistencies, missing values, outliers, and then exported to SPSS version 25 (SPSS Inc., Chicago, IL, USA) for further analysis. Descriptive statistics were computed and summarized in tables, figures and text with frequencies, mean, or standard deviations where appropriate. The association between active trachoma and its independent variables were examined by binary logistic regression. Crude odds ratios were computed to determine the strength of association of the selected explanatory variables with the dependent variable in the initial bivariate logistic regression analysis. Variables that showed an association at a p-value ≤ 0.25 in the bivariable logistic regressions were selected as a potential candidate for multivariable logistic regression analysis to control confounders in the regression models. The final model was fitted using stepwise selection methods (backward conditional). Model fitness was checked using the Hosmer and Lemeshow goodness of fitness test (P-value ≥ 0.05). The association between active trachoma and the independent variables were reported by odds ratio with its 95% CI and variables having a p-value less than 0.05 in the multivariable logistic regression model were considered as statistically significant.

Ethical Consideration

Ethical clearance was obtained from the ethical review committee of Arba Minch University, College of Health Science. A letter of cooperation was obtained from Arba Minch – Health and Demographic Surveillance Site (AM-HDSS), Southern Ethiopia coordination office. The purpose of the study was explained and informed written consent was taken from the head of the household or child caregiver. The reason for the eye examination and what the examination will involve was explained to caregivers. To ensure confidentiality, their names, and other personal identifiers were not registered in the survey tool. Their participation was voluntary. After the interview and eye examination, the research team provided health education on prevention and treatment measures of trachoma, and children with active trachoma were linked with nearby primary eye care unit. The study was conducted in accordance with the Declaration of Helsinki.

Results

Socio-Demographic Characteristics

Eight hundred and thirty-one children (831) were interviewed giving a response rate of 91.6%. The mean age (± SD) of the children was 40.96 (± 10.70) months and slightly more than half (50.9%) were boys. More than three-fourths of the household head were farmers (77.0%) with the average family size of seven. The majority of the child-caregivers were their mother (97.5%), and unable to read and write (62.7%) (Table 1).

Child Personal Hygiene-Related Characteristics

Among the children who participated in study 679 (81.7%) of them had an unclean face. According to the mothers' report about their children, 594 (71.5%) of the children washed their faces only once within 24 hours period of

Table 1 Socio-Demographic Characteristics of the Study Participants in AM-HDSS, Southern Ethiopia from May 01 to June 16, 2019

Variables	Category	Frequency (n=831)	Percentage
Sex of the child	Male	423	50.9
	Female	408	49.1
Age of the child	26–36 months	396	47.7
	37–48 months	277	33.3
	≥49 months	158	19.0
Number of under five years children	Only one	395	47.5
	Two and above	436	52.5
Family size	Less than five	173	20.8
	Five and above	658	79.2
Marital status of the mother or caregiver	Single	46	5.5
	Married	785	94.5
Age of the mother or caregiver	19–34 years	561	67.5
	35–49 years	261	31.4
	≥49 years	9	1.1
Educational status of the mother or caregiver	Not read and write	521	62.7
	Read and write only	26	3.1
	Primary education	199	23.9
	Secondary education	70	8.4
	Vocational and higher education	15	1.8
Caregiver of the child	Mother	810	97.5
	Other*	21	2.5
Educational status of the head of the household	Not read and write	458	55.1
	Read and write only	35	4.2
	Primary education	221	26.6
	Secondary education	94	11.3
	Vocational and higher education	23	2.8
Occupational status of the head of the household	Farmer	640	77.0
	Merchant	40	4.8
	Housewife	35	4.2
	Government employee	26	3.1
	Daily laborer	64	7.7
	Other**	26	3.1

Notes: *Grandparents, Father only, and relatives **Driver, broker, and carpenter.

time and four hundred and thirteen (49.7%) of them did not use soap for washing face.

Health and Environmental-Related Characteristics

Most of the households used pipe water 541 (65.1%), and 467 (56.2%) of the household consume less than 20 liters of water per day. Almost half (47.8%) of the households have animal pens within their living compound, and 305 (36.7%) of the households disposed of solid waste improperly. A total of 638 (76.8%) of the households had a functional latrine (Table 2).

Prevalence of Trachoma Among Preschool Children

Among all children examined for trachoma status, 148 (17.8%) with 95% CI (15%, 20%) children had clinically active trachoma. Among all preschool children examined for trachoma status, 93 (11.2%) had TF with 95% CI (9%, 13%), and 55 (6.6%) had TI with 95% CI (5%, 8%) respectively. Out of 148 children who had active trachoma, 62.84% were trachomatous follicle (TF). There were no TS, TT, and CO stages observed during the study period (Figure 1).

Table 2 Health and Environmental-Related Characteristics of Study Participants in AM-HDSS, Southern Ethiopia from May 01 to June 16, 2019

Variables	Category	Frequency	Percentage
Time is taken to obtain water on walk	≤30 minutes >30 minutes	702 129	84.5 15.5
Source of water	Pipe Protected well Protected spring Unprotected spring	541 156 112 22	65.1 18.8 13.5 2.6
Amount of water used per day	Less than 20 liters 20–40 liters 60–80 liters Greater than 80 liters	443 212 129 47	53.3 25.5 15.5 5.7
Presence of separate room for domestic animals	Yes No	427 404	51.4 48.6
Proper latrine utilization	Yes No	528 305	63.5 36.5
Place where food is cooking	Separately in the living room In the field Living room	567 9 255	68.2 1.1 30.7
Travel time to access primary health care unit on a walk	<30 minutes >30 minutes but < 2 hours. ≥2 hours.	300 465 66	36.1 56.0 7.9
Travel time to access drug store/vendor on a walk	<30 minutes >30 minutes but < 2 hours. ≥2 hrs.	149 395 287	17.9 47.5 34.6
Travel time to access trichiasis surgery facility on a walk	<30 minutes >30 minutes but < 2 hours. ≥2 hours.	– – 831	– – 100%

Factors Associated with Active Trachoma

After adjusting for socio-demographic, child hygienic condition, health and environmental-related factors; the multivariable logistic regression analysis identified time to obtain water, presence of animal pens in the living compound, mechanism of disposing of dry waste, latrine utilization, and unclean face of child as an independent predictor for pre-school- aged children for active trachoma. The odds of developing trachoma among preschool children from households who obtain water for household consumption from greater than thirty minutes walking distance away from their homes were almost 3 times higher than those who obtain water from less than or equal to thirty minutes on a walk (AOR=2.8,95% CI: 1.62, 5.09). Likewise, the odds of having active trachoma among preschool children from households with the presence of animal pens in their living compound were 5 times higher than those households do not have animal pens in their living compound (AOR=5.1, 95% CI: 3.15, 8.33). Compared with their counter parts, the odds of developing active trachoma was also higher among preschool children from households disposed of solid waste improperly (AOR=7.8, 95% CI: 4.68, 13.26), and among preschool children from households' who did not utilize latrine properly (AOR=2.5, 95% CI: 1.63, 3.94). The odds of having active trachoma were also 3.5 times higher among preschool children with flies, nasal discharge, or eye discharge observed on the face compared with their counterparts (AOR=3.5, 95% CI: 2.12,5.97) (Table 3).

Discussion

This study tried to identify the prevalence and associated factors of active trachoma among pre-school aged children in rural communities in the Arba Minch Health and

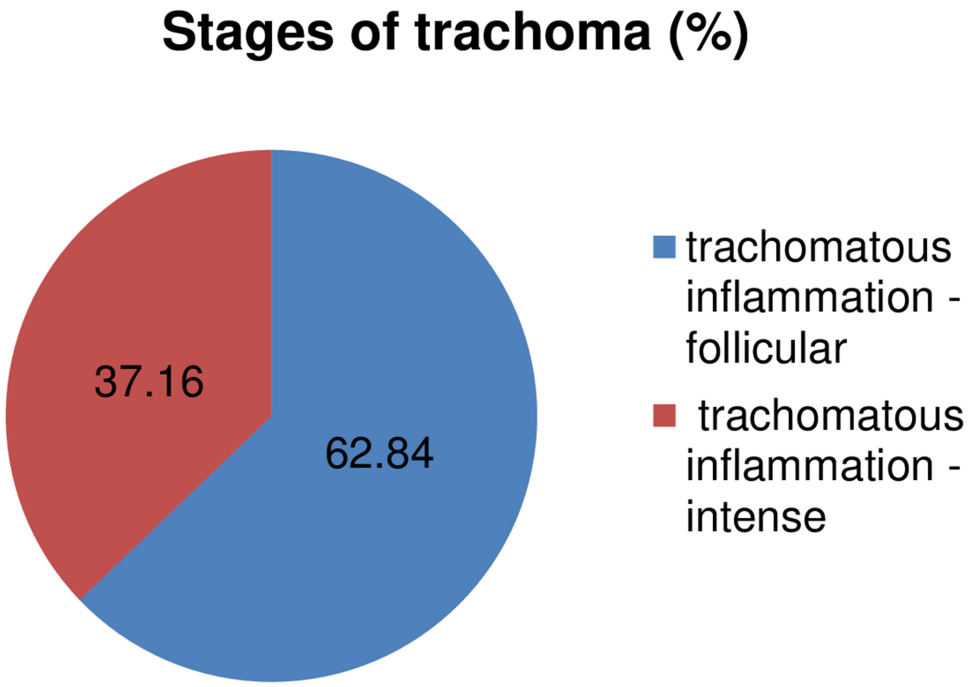

Figure 1 Stages of trachoma observed in pre-school children in AM-HDSS, Southern Ethiopia from May 01 to June 16, 2019.

Demographic surveillance site. The finding from the study revealed that the overall prevalence of clinically active trachoma among preschool children was 17.8% with 95% CI (15%, 20%). This is greater than WHO criteria for the elimination of trachoma as a public health problem, the prevalence of TF to a level <5%.[8] The finding is consistent with the study conducted in Dembia district, Northwest Ethiopia.[7] The finding of the current study is higher compared to findings from studies conducted among preschool-aged children in Sao Paulo Brazil[27] and Gambia,[28] and lower than the studies conducted in Tanzania[28] and North-Eastern Nigeria.[26] The difference could be attributed to differences in study setting, study period, geographical variations, infrastructure, social connections, and health-care facilities. The other reasons for variations might be due to differences in utilization of sanitary services and variation in the implementation of the SAFE strategy for eliminating trachoma. The finding of the study confirmed that trachoma is still a disease of public health interest. Ethiopia is home to about 13 million children under 5 years of age – approximately 16% of the total population.[30] Given this huge number of children, adequate attention was not yet given for this specific population. To meet the GET2020 targets[8] and the health sector transformation plan of Ethiopia,[25] interventions targeted to preschool children have paramount importance. Time taken to obtain water for household consumption was significantly associated with the development of clinically active trachoma. This finding is consistent with the study conducted in Tanzania[28,31] and Ethiopia.[7,23,32] These studies reported that the prevalence of active trachoma in children significantly increased with increasing reported water collection time. On the contrary, there was no significant association between the quantities of water consumed per house household with active trachoma. This indicates that using the highest volume of water for household consumption is not a guarantee for preventing trachoma. The possible explanation might be that the water that is fetched and used by the rural community might not be safe enough for keeping personal hygiene.

In the present study, preschool children from households with the presence of animal pens in the living compound were more likely to develop active trachoma compared with their counterparts. This association might be due to increased exposure of children to flies that transmit trachoma and breed in exposed animal feces. An animal pen in the living compound is very common in the study area so that the finding suggests that exposed animal feces increase the vulnerability of the children to trachoma. Therefore, the local government needs to intervene in this particular issue. Similarly, the odds of developing trachoma among pre-school children whose households do not dispose of solid waste properly were

Table 3 Factors Associated with Active Trachoma (TF) or (TI) Among Preschool-Aged Children in Arba Minch Health and Demographic Surveillance Site, Southern Ethiopia, 2019

Variables	Active Trachoma		P-value	COR (95% CI)	AOR (95% C.I)
	No	Yes			
Time to obtain water					
≤30 minutes	591(84.2%)	111(15.8%)		1	1
>30 minutes	92(71.3%)	37(28.7%)	<.001	2.1(1.39,3.29)	2.8 (1.62,5.09)*
Source of water					
Pipe	469(86.7%)	72 (13.3%)		1	1
Protected well	113(72.4%)	43(27.6%)	.155	2.4 (1.61,3.81)	1.5(.85,2.63)
Protected spring	84(75.0%	28 (25.0%)	<.001	2.1 (1.32,3.56)	3.8(1.86,8.03)
Un protected spring	17 (77.3%)	5(22.7%)	.225	1.9(0.68,5.35)	2.2(0.60,8.47)
Presence of animal pens in the living compound					
Yes	301(75.8%)	96 (24.2%)	<.001	2.3(1.61,3.39)	5.1 (3.15,8.33)*
No	382(88.0%)	52 (12.0%)		1	1
Mechanism of disposing of dry waste					
Proper	467(88.8%)	59(11.2%)		1	1
Improper	216(70.8%)	89(29.2%)	<.001	3.2 (2.26,4.70)	7.8(4.68,13.26)*
Proper latrine utilization					
Yes	467(88.4%)	61(11.6%)		1	1
No	216(71.3%)	87(28.7%)	<.001	3.0 (2.14,4.44)	2.5(1.63,3.94)*
Unclean child face (observed)					
Yes	401(76.7%)	122(23.3%)	<.001	3.3 (2.10,5.17)	3.5(2.12,5.97)*
No	282(91.6%)	26(8.4%)		1	1
time is taken to reach a primary health care unit on a walk					
< 30 minutes	260(86.7%)	40 (13.3%)		1	1
30 minutes to 2 hrs.	370(79.6%)	95(20.4%)	.230	1.6(1.11,2.49)	.65 (.32,1.30)
>= 2 hrs.	53(80.3%)	13(19.7%)	.271	1.6(0.79,3.18)	1.7 (.65,4.64)
time is taken to reach drug store/vendor on a walk					
< 30 minutes	126(84.6%)	23(15.4%)		1	1
30 minutes to 2 hrs.	303(76.7%)	92 (23.3%)	.102	1.6 (1.00,2.74)	2.0(.86,4.80)
>= 2 hrs.	254(88.5%)	33(11.5%)	.006	0.7 (0.40,1.26)	0.2(.12,.70)

Note: *Significant at $P \leq 0.05$.
Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio.

almost eight times higher than that of children whose households properly dispose of solid waste. This could be explained by the fact that disposing of solid waste on open field attracts a high number of eyes seeking flies that lead to a high chance of transmission of active trachoma in the children. The finding is concordant to the studies conducted in Lemo district, Southern Ethiopia,[6] Gondar Zuria District North Gondar,[33] and Loma Woreda, Dawro Zone, Ethiopia.[34]

In the present study, we observed that preschool children from households who do not utilize latrine properly were more likely to develop active trachoma compared with households utilize latrine properly. This result was in agreement with the study conducted in Lemo district, Southern Ethiopia,[6] and West Gojjam Zone, North West Ethiopia.[32] This could be reasoned out that proper latrine utilization may reduce eye-seeking flies in the surrounding environment.

Facial cleanliness of the children was also significantly associated with the development of active trachoma. Children with unclean faces were more likely to have trachoma when compared with those children whose faces were clean. Studies that had been conducted elsewhere[7,10,20,28,29] reported similar findings. The possible explanation is because unclean faces attract eye-

seeking flies (*Musca sorbens*) which are potential mechanical vectors of Chlamydia trachomatis infection.[35] Nasal and ocular discharges may both result from the inflammation of active trachoma and make the child face dirty which potentially attracts eye-seeking flies.

This study has some limitations which have to be taken into consideration while interpreting the findings. As being cross-sectional in the design, it does not confirm the definitive cause and effect relationship. This study is also subject to residual confounding since some potential factors such as fly density, time taken to obtain water, water quality issues, and amount of water used per capita for face washing was not well addressed or measured. Due to a lack of sufficient resources, the positive result of trachoma status could not be confirmed by advanced laboratory tests so that differential diagnosis may overestimate the result. Some variables such as using soap for face washing and face washing frequency of children could be subjected to responder bias.

Conclusion

The study revealed that the prevalence of clinically active trachoma among pre-school aged children was high in Arba Minch HDSS site. Time to obtain water, presence of animal pens in the living compound, mechanism of disposing of dry waste, latrine utilization, and unclean face of child were significant factors associated with active trachoma. The findings of the current study suggest "F" and "E" components of the SAFE strategy are vital components in working towards the 2020 target of eliminating trachoma and SDG target 3.3, ending the epidemics of neglected tropical diseases by 2030. Therefore, stakeholders at different hierarchies need to exert continuing efforts to integrate the trachoma program with other public health programs, with water, sanitation and hygiene (WASH) programs and/or with the education system.

Data Sharing Statement

All the data are presented in the manuscript and Supplementary material.

Acknowledgments

The authors are grateful for the data collectors, the study participants, and supervisors for their co-operation during data collection. Our thanks also go to Arba Minch University for providing ethical clearance.

Disclosure

The authors report no conflicts of interest in this work.

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