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RESEARCH ARTICLE

Prevalence of Trachoma and Associated Factors Among Children Aged 1– 9 Years in Rural Communities of Kombolcha District, East Hararge, Oromiya Regional State, Ethiopia, 2021

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Abstract

Introduction: Trachoma, caused by Chlamydia trachomatis, is the leading cause of blindness worldwide. Globally, 42 countries, mainly in Africa, are endemic for blinding trachoma, representing 68% of these countries and carrying 80% of the global burden. Despite the availability of effective prevention strategies and treatment, trachoma remains the leading cause of blindness worldwide, including in Ethiopia and specifically in the study area.

Objectives: This research aimed to assess the prevalence of trachoma and associated factors among children aged 1–9 years in rural communities of Kombolcha district, East Hararge zone, Oromia Regional State, Ethiopia, in 2021.

Methods: A community-based cross-sectional study design was conducted among children aged 1–9 years in rural communities. The study participants (n=622) were selected using a multistage random sampling method. Data were collected through face-to-face interviews using a structured questionnaire. The questionnaire was pre-tested on 5% of the total sample size. Data were checked, entered into Epi Info version 7.1, and exported to SPSS version 23 for analysis. Variables with a p-value < 0.20 in bivariate binary logistic regression were entered into a multivariate binary logistic regression model to identify factors associated with trachoma. Adjusted odds ratios with 95% confidence intervals were used to assess the strength of associations between the outcome and predictor variables at a p-value < 0.05.

Results: The overall prevalence of active trachoma among children aged 1–9 years was 7.55%. Among the affected children, 83% had trachomatous inflammation follicular (TF), 11% had trachomatous inflammation intense (TI), and 6% had both TF and TI. The prevalence varied from 2.7% in children aged 1-4 years to 10.4% in children aged 5-9 years. Factors associated with the presence of active trachoma in this study population were households with unprotected water sources

AOR=0.32, 95% CI: (0.15-0.67), towel usage AOR=8.03, 95% CI: (2.18-29.6), not using soap to wash their face AOR=4.53, 95% CI: (2.13-9.63), and a family history of eye problems AOR=4.76, 95% CI: (2.19-10.35).

Conclusion and Recommendation: The overall prevalence estimate of active trachoma in the study area was 7.55%. Although there is a high risk of active trachoma, the prevalence has reduced by 2.45% compared to the threshold at which the World Health Organization (WHO) recommends mass drug administration (MDA) of antibiotics (>10% prevalence). Therefore, it is crucial to implement the WHO-endorsed SAFE strategy and improve the overall living conditions of the community through coordinated efforts**.**

Keywords: Associated Factor; Children Aged 1-9 Years, kombolcha District; Prevalence; Trachoma

Introduction

Trachoma, a neglected tropical disease, is the world's leading infectious cause of blindness [1]. It is among the oldest diseases known to mankind [2].Children generally have the highest prevalence of trachoma and are believed to be the main reservoirs of infection [3].

Based on reporting by the World Health Organization (WHO) in February 2018, trachoma remains endemic in 42 countries in which approximately 1.9 million people have visual impairment due to trachoma [4]. Globally, 200 million people are still at risk of trachoma, and 3.2 million people need surgery to avoid blindness because of trachoma [5]. In 2013 World Health Organization (WHO) estimated that 84 million people worldwide are affected by this disease, eight million of the people were suffer from visual impairment [6].

The primary trachoma-endemic countries were Africa, Asia, and Latin America. From Latin America, the disease was endemic in Brazil, Columbia, Guatemala, and Chiapas, Mexico [7]; whereas it is endemic in China, India, Myanmar, and Pakistan from Asia and in Ethiopia, Nigeria, Mali, and Sudan from Africa [8]. China, Sudan, and Ethiopia bear at least 50% of the burden of trachoma prevalence worldwide.Concerning to Africa, the overall trachoma prevalence in Algerian school health was 26% whereas the national prevalence in Burkina Faso was 26.9% (TF).In Ghana the overall prevalence and prevalence among children less than 10 years was 29.7% and 16.1%(TF/TI) respectively [9].

National prevalence of blindness in Ethiopia were estimated to be 1.25% [10]. Similarly, state that more than 70% of blindness in Ethiopia was caused by trachoma and cataract. Prevalence of active trachoma was 45%, Trachomatous conjunctival scar 80%, Trachomatous trichiasis 3% &Corneal opacity 0.4% [11] while the number of people who urgently need eyelid surgery to prevent blindness were over 693,000 [12]. In line with this, In Oromia region trachoma presents as a public health problem, of which both active and blinding trachoma were prevalent in 218 districts of the region, as the study shows the prevalence of active trachoma among children age 1-9 year were 25.2% [13].

The major cause of trachoma in many under privileged communities of developing countries were poor hygiene and inadequate sanitation; mainly due to lack of water, living with a trachoma case, overcrowded living conditions, practice of open defecation and poverty [14]. Similarly young age, infrequent face washing habit, not using soap during washing, poor practice of waste disposal and parent literacy were among the risk factors [15].

These inadequate hygiene and sanitation service provision forced the WHO to recommends the new SAFE strategy as a way to eliminate blindness caused by trachoma until 2020 [16]. WHO in cooperation with other various NGO and national health services, through the Global Alliance for the Elimination of Trachoma by 2020, recommended that any individual with TT should

be offered surgery [17,18]. Mass drug administration to the entire community were also recommended on a regional or district basis when prevalence exceeds 5% in children aged 1-9 [19].

Infectious diseases have been the most important contributor to human morbidity and mortality until relatively recent times and still accounts for a large proportion of death and disability worldwide. In certain regions infectious diseases remains the most important cause of ill health and have been responsible for 22% of all deaths and 27% of disability-adjusted life years worldwide [11]. They have imposed a burden on the young, notably on children under 5 years. Eye problems are recognized as among one of the major public health challenges in many developing countries [21].

Trachoma is the leading infectious cause of blindness, and is caused by conjunctiva infection with the bacterium Chlamydia trachomatis. Early infection manifests as redness and irritation, with follicles on the tarsal conjunctiva; this may meet the definition of trachomatous inflammation–follicular (TF) of the WHO simplified trachoma grading system. Repeated infections may result in scarring of the conjunctivae and alteration in eyelid morphology and function such that in-turning of the eyelashes ensues; this condition is known as trachomatous trichiasis (TT). The in-turned eyelashes rub on the cornea and cause devastating pain at each blink [22].

Nearly 182 million people live in trachoma endemic areas and are at risk of trachoma blindness. The disease is a public health problem in 42 countries, and responsible for the blindness or visual impairment of about 1.9 million people [23]. The disease can be transmitted by the discharge from infected eyes of individuals and transferred by fingers, eye-seeking flies or by clothes to the eyes of non-infected ones. Trachoma is prevalent in areas where personal and community hygiene is poor, and it mainly affects deprived and marginalized classes of a community [24].Ethiopia is one of the most severely affected trachoma endemic countries in the world with the highest prevalence in Amhara, Oromia and Southern Nations, Nationalities, and Peoples (SNNPR) regions [25].According to the 2016 Global Health Observatory, there are more than 75 million people living in trachoma-endemic areas in Ethiopia, the largest number of any country in the world.

Trachoma, caused by Chlamydia trachomatis, is the leading cause of blindness worldwide. Despite the availability of effective prevention and treatment strategies, trachoma remains prevalent, particularly in Ethiopia. In Ethiopia, trachoma poses a significant public health concern, and its impact on the rural communities of the Kombolcha district in East Hararge, Oromiya Regional State.

The significance of studying trachoma in Ethiopia, especially in the Kombolcha district, lies in the high burden of this disease and its potential to cause long-term visual impairment and blindness among children. By investigating the prevalence of trachoma and associated factors in this specific region, we aim to contribute to the existing literature by bridging the gap in knowledge and providing valuable insights into the epidemiology of trachoma in rural communities.

This study not only aims to determine the prevalence of trachoma but also explores the factors associated with its occurrence among children aged 1-9 years. By understanding these associations, we can identify potential risk factors and inform targeted interventions for trachoma prevention and control in the study area.

The implications of these associations in the context of the study area are multifaceted. Identifying the specific risk factors for trachoma in the Kombolcha district will enable local health authorities to implement evidence-based interventions that address the unique challenges faced by this community. Furthermore, our findings will contribute to the broader understanding of trachoma epidemiology in Ethiopia, allowing for better planning and allocation of resources to tackle this preventable and treatable disease.

It is important to emphasize the significance of implementing the World Health Organization (WHO)-endorsed SAFE strategy

(Surgery, Antibiotics, Facial cleanliness, and Environmental improvement) to control and eliminate trachoma. This comprehensive approach has proven effective in reducing the burden of trachoma in various settings worldwide [20]. By highlighting the importance of implementing this strategy, we underscore the need for a holistic and integrated approach to trachoma prevention and control efforts.

Methods and Materials

Study Design and Period

Community based cross sectional study design was employed, from October, 2021 to December, 2021.

Study Area

The study was conducted in Kombolcha district, located in the East Hararge Zone of eastern Ethiopia. The district is situated approximately 567 km from Addis Ababa. It shares borders with the Harari Regional State to the south, Haro Maya woreda to the southwest, Dire Dawa council to the northwest, the Somali Regional State to the north, and Jarso woreda to the east.

According to the 2007 population projection, the district had a total population of 201,376 in 2020, with 97,667 males and 103,709 females. The district has a total of 41,953 households, and approximately 90% of the population resides in rural areas. The majority of the population (92.5%) speaks Afaan Oromo as their first language, while 7.3% speak Amharic. For administrative purposes, the woreda is divided into 19 rural kebeles.

In terms of healthcare facilities, there are 5 public health centers, 21 health posts, and 28 clinics owned by private organizations in the district. These facilities provide healthcare services to approximately 89% of the population, resulting in a relatively high potential health service coverage.

The study area was selected because no similar studies were found during the literature search. Conducting the study within the community was deemed appropriate to efficiently gather data from children in the specified age group within a short period, especially during an epidemic. Moreover, the majority of the woreda population relies on government-owned and operated health facilities for their healthcare needs.

Source and Study population

Source Population

The source population for this study consisted of all children aged one to nine years residing in rural communities of Kombolcha district.

Study Population

This study included children between the ages of one to nine years who were living in households selected through a systematic sampling technique. The selection of households was done from randomly selected rural kebeles within Kombolcha district

Inclusion Criteria: The study population included all children aged 1-9 years living in the rural community of Kombolcha district in 2021.

Exclusion: - Children who were unable to undergo physical examination due to serious medical illness during the study period were excluded from the study in order to ensure the accuracy and reliability of the data collected.

Sample Size and Sampling Procedures

Sample Size Determination

Based on the information provided, it appears that the sample size for the study was calculated using the single population proportion formula for the first objective and the double population proportion formula for the second objective. The prevalence of trachoma among children aged 1-9 years old was reported to be 25.2%, based on a similar study conducted in Kersa District, Jimma Zone, Southwest Ethiopia in 2013[26].

For the first objective, which involved calculating the prevalence of trachoma with a margin of error of 5% and a 95% confidence interval, the single population proportion formula was used. A design effect of 1.5 and a 10% non-response rate were considered in the calculation. The sample size calculated using this formula was 622 children.

It is important to note that the largest sample size calculated between the two objectives was selected to ensure adequate power and precision in the study results. In this case, the sample size calculated for the second objective using the double population proportion formula was likely larger than the sample size calculated for the first objective, leading to the selection of 622 children as the final sample size for the study.

Objective 1: The sample size for objective one was calculated using single population proportion formula, by taking the following assumption. Study conducted in Kersa District, Jimma Zone, Southwest Ethiopia in 2013 revealed that Prevalence of trachoma among children aged 1-9 years old, were 25.2% [26].

$$n = \frac{\left(Z\frac{\alpha}{2}\right)^2 * p(1-p)}{d^2}$$

Were,

n= the required sample size

P = 25.2% (Prevalence of trachoma taken from previous study)

$Z_{\alpha/2}$ = 95% (1.96) (Confidence level)

d = 5% (0.05) desired precision or margin of sampling error

$$n = \frac{(Z_{\alpha/2})^2 X P(1-P)}{d^2} = \frac{(1.96)^2 X 0.252(1-0.252)}{(0.05)^2} = 294$$

Non-Response Rate (NRR) = 10%.

By taking 10% non-response rate and design effect 1.5, the total sample size was **(294+29) *1.5** = **484**. Sample respondents will be drawn from four rural kebeles randomly selected from 19 rural kebeles of the study district that is why design effect will be used.

Objective 2: Sample size is determined based on factors associated with Trachoma among children of rural community using double population proportion formula at 95% CI with Z = 1.96, 80% power of the study, 1:2 ratio, two population proportion formula used and calculate by Epi Info version 7 Stat Calculator computer software program used, which gives as 622.

Table 1: Sample size calculated for the prevalence of trachoma and Associated factors.

Factors considered	Proportion –value	Sample	OR	Calculated sample size	Reference
Unclean face	% of cases in children who have no unclean face =42%.	224	2.4	338	(27)
	% of cases in children who have unclean face =58%.				
Not have functional latrine	% of cases in children, HH who have not functional latrine=40%.	26	4.39	214	(28)
	% of cases in children, HH who have functional latrine =9.2%.				
Waste around house	% of cases where no waste around house =53.8%.% of case where have waste around house=68.5%.	374	1.68	622	(6)

Sampling Procedure

The use of a multi-stage sampling technique in selecting children aged 1-9 years old for the study helps ensure a representative sample from the population of interest.

In the first stage, Kombolcha district was selected purposively due to its proximity to the researchers and its potential for trachoma cases. This initial selection helps focus the study on an area where trachoma prevalence may be higher, increasing the likelihood of capturing relevant data.

In the second stage, five kebeles were selected from the 19 rural kebeles of Kombolcha district using a lottery method of simple random sampling. This random selection of kebeles helps reduce bias and ensures that a variety of areas within the district are represented in the study.

In the third stage, households with children aged 1-9 years old were selected through systematic sampling method using proportional to their size. This method helps ensure that households are selected in a structured and representative way based on their size and distribution within the selected kebeles.

If more than one child aged 1-9 years old was present in a selected household, one child was chosen through a lottery method of simple random sampling. This approach helps ensure fairness in selecting individual children within households and avoids potential biases.

Overall, the use of a multi-stage sampling technique with careful consideration of different levels of selection helps enhance the representativeness and validity of the study findings related to trachoma prevalence among children aged 1-9 years old in Kombolcha district.

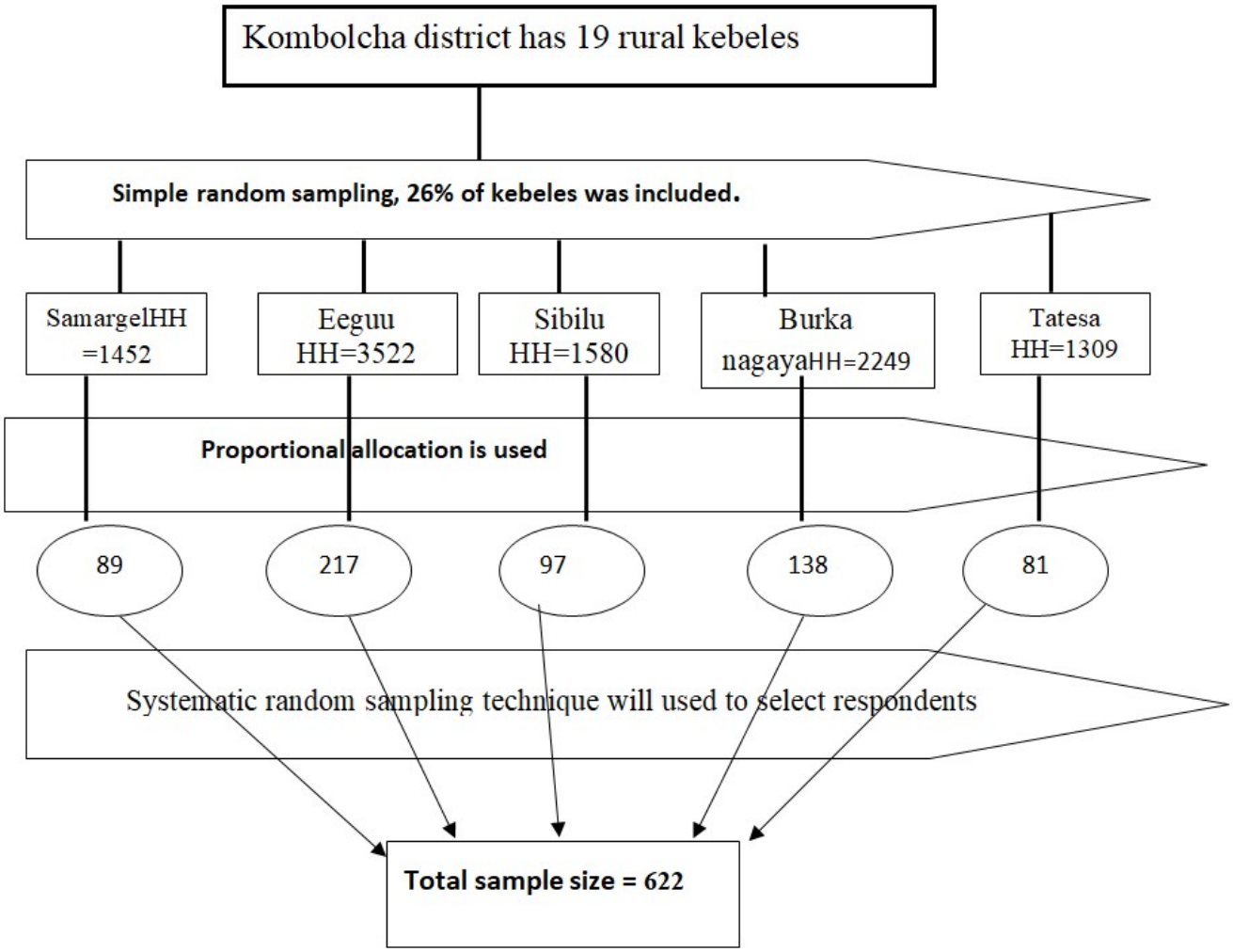

Figure 1: Schematic representation of the sampling method to assess prevalence of trachoma and associated factors among children aged 1– 9 years in rural communities of komolcha district.

Variables of the study

Dependent variable

Active Trachoma

Independent variables

The socio-demographic characteristics of the respondents and their families play a crucial role in understanding the context and potential risk factors associated with trachoma prevalence among children aged 1-9 years old. These characteristics provide valuable insights into the social, economic, and environmental factors that may influence the occurrence of trachoma in the study population.

1. Family Background:

- Educational Status: The educational level of parents or caregivers in the household can impact knowledge and practices related to hygiene and sanitation, including facial cleanliness.

- Religious Affiliation: Religious beliefs and practices may influence behaviors related to hygiene and health-seeking behaviors.

- Occupation: The type of occupation of family members can affect access to resources, healthcare services, and living conditions that may contribute to trachoma risk.

- Eye Problems: Prevalence of eye problems within the family may indicate genetic predisposition or environmental factors contributing to eye health.

- Marital Status: Family structure and dynamics, such as single-parent households or extended families, can influence caregiving practices and access to resources.

2. Child's Personal Factors:

- Face Washing Frequency: Regular face washing is a key preventive measure against trachoma infection.

- Use of Soap to Wash Face: Proper hygiene practices, including the use of soap, can reduce the transmission of trachoma.

- Facial Cleanliness: The cleanliness of the child's face is directly related to trachoma prevention and control.

- Education Level: The educational level of the child may influence their understanding of hygiene practices and disease prevention.

- Cattle Ownership: Livestock ownership can impact environmental hygiene and sanitation practices within the household.

3. Household Environmental Factors:

- Latrine Availability: Access to sanitation facilities is crucial for maintaining good hygiene and preventing trachoma transmission.

- Latrine Distance from House: Proximity of latrines to living areas can affect hygiene practices and exposure to fecal contamination.

- Housing Condition: Overcrowding, poor ventilation, and inadequate housing conditions can contribute to the spread of infectious diseases.

- Availability of Waste Disposal Site: Proper waste management is essential for preventing environmental contamination and disease transmission.

- Availability of Water Source: Access to clean water for hygiene practices, such as face washing, is critical for trachoma prevention.

By examining these socio-demographic characteristics and environmental factors, researchers can identify potential risk factors for trachoma transmission and develop targeted interventions to reduce its prevalence among children in the study population.).

Operational Definitions

Active trachoma: TF has been suggested by WHO as the key indicator for assessing the public health importance of active tra-

choma. Hence, it was defined as the presence of at least five or more follicles in the upper tarsal conjunctiva each at least 0.5 mm in size.(29).

Clean face: a child who did not have an eye discharge or nasal discharge and fly on the face at the time of visit.

Corneal opacity (CO): Easily visible corneal opacity over the pupil.

Liquid waste around the house: Domestic waste waters come from a day-to-day living (generated from food preparation, washing, bathing and toilet usage).

Proper liquid waste disposal: Collecting the waste liquid into a closed place and dispersing it at the front of the main door of the house on a wide area at the night since the housefly is inactive at the night time.

Trachomatous conjunctival scar (TS): The presence of scarring in the tarsal conjunctiva (29)

Trachomatous inflammation-intense (TI): Pronounced inflammatory thickening of the tarsal con- junctive that obscures more than half of the deep normal vessels (29).

Trachoma negative (TN): Children that do not have signs of active trachoma like a trachomatous conjunctival scar (TS), trachomatous trichiasis (TT) Trachomatous inflammation-intense (TI), Trachomatous inflammation-follicular (TF) and corneal opacity (CO).

Trachomatous trichiasis (TT): At least one lash rubs on the eyeball.

Unclean face: Having any discharge on eyes, nose and/or fly on the face at the time of visit.

Free from Trachoma – children that did not have signs or symptoms of active trachoma.

SAFE - a strategy developed to eliminate blindness caused by Trachoma through doing surgery, antibiotic treatment, facial cleanliness and improving the environment.

Data Collection Procedures (Instruments, Personnel, Measurements)

The data collection process for the study on trachoma prevalence among children aged 1-9 years involves a comprehensive approach that includes both questionnaire-based interviews and clinical examinations. Here's a summary of the key components of the data collection process:

1. Data Collection Team:

- Trained Ophthalmic Nurses and IECW: The data collection team consists of trained ophthalmic nurses and IECW (Information, Education, and Communication Workers) who are responsible for conducting face-to-face interviews with mothers or caregivers, as well as direct observations to assess socio-demographic characteristics, hygiene, and sanitation practices.

2. Interview Process:

- Face-to-Face Interviews: The mothers or caregivers of children aged 1-9 years are interviewed using a structured and pretested questionnaire to gather information on socio-demographic characteristics, hygiene, and sanitation practices within the household.

3. Clinical Examination for Trachoma Status:

- Trained Data Collectors: Trained data collectors, including BSC nurses and licensed ophthalmic nurses, conduct clinical examinations to assess the trachoma status of the children.

- Examination Procedure: Using a binocular loupe and a hand flashlight, each eye of the children is examined separately in daylight conditions. The WHO simplified grading scheme is used to assess signs of trachoma.

- Hand Hygiene: The examiners maintain hand hygiene by cleaning their hands with a disinfectant solution (alcohol) between each examination to minimize the risk of cross-infection.

4. Supervision and Expert Involvement:

- Ophthalmologists' Supervision: The clinical examinations for trachoma are conducted under the supervision of ophthalmologists who have extensive experience in grading trachoma using the WHO grading scheme.

- Involvement of Health Workers: Eight health workers, including five BSC nurses, two IECW, and one licensed ophthalmic nurse, are involved in the data collection process under the supervision of the investigator.

Overall, the data collection process integrates both qualitative and quantitative methods, ensuring a comprehensive assessment of socio-demographic characteristics, hygiene and sanitation practices, as well as accurate clinical examination for trachoma status among children. The involvement of trained professionals and expert supervision enhances the reliability and validity of the collected data

Data Quality Assurance

The pretest conducted on 31 children from a rural community in a Kebele with similar socio-demographic characteristics as the selected Kebeles is a valuable step to assess the feasibility and appropriateness of the study tools and procedures. Based on the pretest results, necessary revisions can be made to ensure the effectiveness and relevance of the data collection process.

The comprehensive training provided to the data collectors on various aspects, including study tools, objectives, respondent rights, confidentiality, and interview techniques, demonstrates a commitment to ensuring ethical and professional conduct during data collection. Additionally, the close supervision of the data collection process through daily checks of questionnaires further emphasizes the importance of data quality and accuracy.

The specialized training on eye examination, grading, and reporting provided to the data collectors by ophthalmic nurses from the Woreda's Health Center is crucial for ensuring standardized and accurate clinical assessments of trachoma status among the selected study children. The immediate deployment of trained health professionals to the sampled rural Kebeles for eye examinations reflects a proactive approach to initiating data collection promptly following the completion of training.

Overall, the emphasis on pretesting, thorough training, and close supervision highlights a robust and meticulous approach to data collection, which is essential for obtaining reliable and valid results for the study on trachoma prevalence among children aged 1-9 years.

Data Processing and Analysis

The systematic approach to data management and analysis outlined in your description is commendable. By checking the data for completeness, consistency, and missed values, you are ensuring the quality and integrity of the dataset before proceeding

with analysis.

Utilizing Epi Info version 7.1 for data entry and SPSS version 23 for analysis is a common and reliable choice of software tools for epidemiological studies. The use of descriptive statistics such as median, frequencies, and percentages will provide a clear summary of the data, allowing for a better understanding of the characteristics of the study population.

The decision to conduct binary logistic regression to identify candidate variables for the final model is appropriate for assessing the factors associated with trachoma prevalence. By setting a threshold of $P < 0.20$ in the bivariate analysis to determine which variables to include in the multivariate model, you are following a systematic approach to variable selection.

Using the stepwise method for variable selection in the multivariate binary logistic regression model helps in identifying the most significant predictors of trachoma prevalence while controlling for potential confounding factors. The reporting of adjusted odds ratios with corresponding confidence intervals at a significance level of $P < 0.05$ provides a robust measure of the strength and direction of associations between predictor variables and the outcome.

Overall, your planned data analysis strategy demonstrates a rigorous and methodical approach to investigating the factors associated with trachoma prevalence among children aged 1-9 years in the selected rural communities.

Ethical Considerations

It is commendable that you have obtained ethical clearance for your study and have put in place measures to ensure the protection of human subjects. The formal consent from Arsi University College of Health Sciences Department of Public Health and the official letter of cooperation from the concerned bodies of Kombolcha district administration offices and health office demonstrate a commitment to ethical research practices.

The explanation provided to the respondents about the purpose of the study, its procedures, and their right to refuse participation or withdraw at any time, along with obtaining verbal consent, shows a respectful and transparent approach to engaging with the study population. Additionally, assuring confidentiality and collecting data anonymously are important steps in protecting the privacy and rights of the participants.

It is also noteworthy that you have planned for the referral of respondents with trachoma positive findings to nearby health facilities for further investigation and treatment. This demonstrates a commitment to the well-being of the participants and reflects a responsible approach to addressing potential health concerns identified during the study.

Overall, your attention to ethical considerations in the planning and conduct of your research is vital for ensuring the integrity and credibility of your study.

Result

Socio Demographic characteristics of the Respondents

A total of 622 children between the ages of 1 and 9 participated in the study, with a 100% response rate. Of these children, 44.2% (275) were male and 55.8% (347) were female. The average age of the participants was 5.35 years, with a standard deviation of 2.2 years. The majority of the participants (64.3% or 400 children) were 5 years of age or older, while 35.7% (222 children) were 4 years of age or younger.

Among the children aged 1-9 years in the sample, 20.1% (125 children) were enrolled in school, while 79.9% (497 children) were not.

Regarding the education level of the children's parents, 52.6% (327 mothers) were unable to read or write, while only 16.7% (104 mothers) and 1.0% (6 mothers) had attended primary and secondary school, respectively. Of the 47 children who had trachoma, 68.1% (32 children) came from families where the mothers were unable to read or write.

The majority of household heads (85.7% or 533 individuals) were farmers by occupation. There was a statistically significant difference ($p < 0.01$) between respondents whose children had trachoma and those whose children did not, with the mean family size being 5.26 (SD ± 1.69) persons.

Most of the participants (96%) were Muslim, and the largest ethnic groups represented were Oromo (95.5%) and Amhara (4%). The average reported monthly income of the households was 816.2 Ethiopian Birr (ETB), and 97.9% (46 cases) of the trachoma cases were reported from households with a monthly income of 2500 ETB or less. (Table 2)

Table 2: Socio Demographic characteristics of the study participants in in Kombolcha district, Southeast Ethiopia, December, 2021 (n =622)

characteristics	Categories	Frequency (n)	Percentage (%)	
Sex of the children	**Male**	275	44.2	
	Female	347	55.8	
Age of the children	*1-4 year*	222	35.7	
	≥5 year	400	64.3	
Ethnicity	Amhara	25	4.0	
	Oromo	594	95.5	
	Others#	3	0.5	
Religion	Muslim	602	96.8	
	Orthodox	20	3.2	
Educational status of the child	Enrolled at school	125	20.1	
	Not enrolled at school	497	79.9	
Variables	**Category**	**NTR**	**TR**	χ^2
		N (%)	**N (%)**	
Mother's Educational level	Unable to read and write	295 (51.3%)	32 (68.1%)	0.263
	Able to read and write	175 (30.4%)	9 (19.1%)	
	Primary education.	98 (17%)	6 (12.8%)	
	Secondary education	6 (1%)	0 (0%)	
	College and above	1 (0.2%)	0 (0%)	
	Total	**575 (100%)**	**47 (100%)**	
HH's Occupation	Farmer.	494 (85.9%)	39 (83%)	**0.002*****
	Merchant	23 (4%)	1 (2.1%)	
	Employed	5 (0.9%)	0 (0%)	

	Daily Lobar	9 (1.6%)	5 (10.6%)	
	Both farmers & merchant	44 (7.7%)	2 (4.3%)	
	Total	**575 (100%)**	**47 (100%)**	
HH's Monthly Income (Birr)	≤2500	566 (98.4%)	46 (97.9%)	0.768
	>2500	9 (1.6%)	1 (2.1%)	
	Total	**575 (100%)**	**47 (100%)**	

Source: Own survey. 2021. ***= Significant at p-value of <0.01, # = Gurage, Somali and Harari

Environmental Health Related Factors of Participants

The majority (54.2%) of the study participants' families had to travel less than 30 minutes to fetch water, while 9.3% had to travel 1 hour or more, among which 22.4% had children infected with trachoma.

Even though more than half of the participants (61.3%) had adequate water per capita per day, 38.7% who did not have adequate water and 28.9% who did not have a functional latrine accounted for 11.5% and 12.2% of trachoma cases, respectively.

On the other hand, more than half of the respondents (58%) did not have a designated pit for waste disposal (and practiced open dumping), which led to 10.2% of the children having trachoma.

There was a statistically significant difference ($p < 0.01$) between respondents with trachoma-positive children and those with trachoma-negative children in terms of adequacy of water for consumption, time taken to travel to fetch water, availability of a functional latrine, and waste disposal site. (Figure 2).

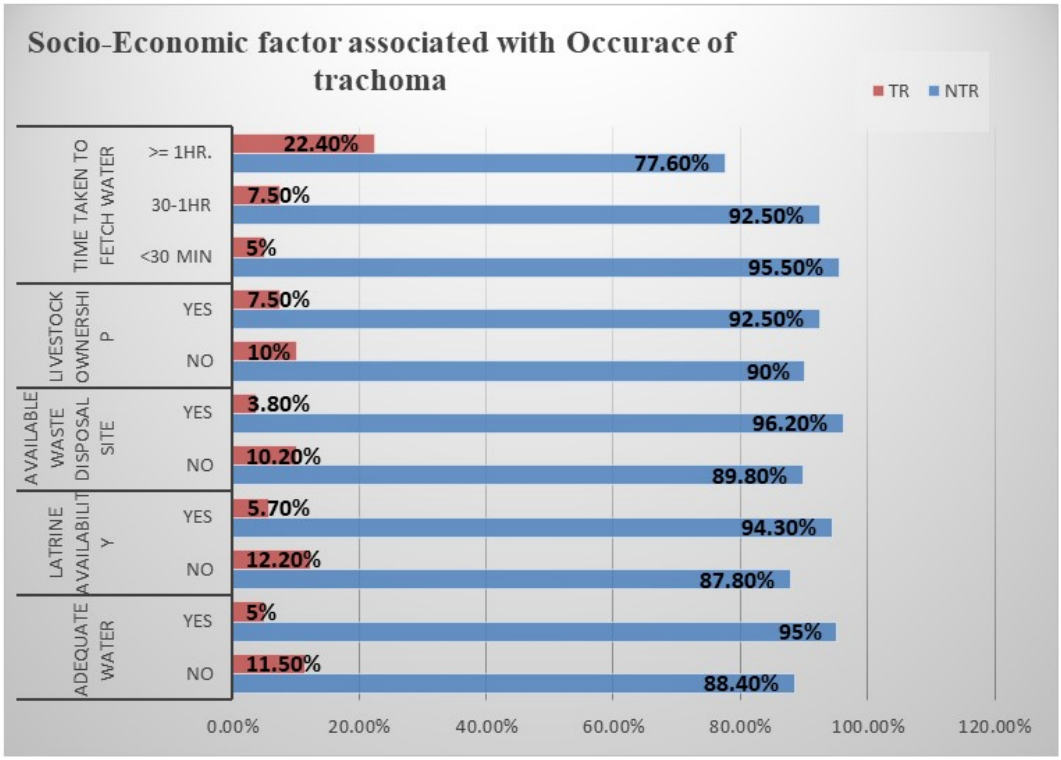

Figure 2: Socio-Economic factors associated with the occurrence of trachoma in Kombolcha district, Southeast Ethiopia,December 2021 (n =622)

Of the 47 children with trachoma in the study area, the majority (39 or 83%) were at the stage of trachomatous folliculitis (TF), while 5 (11%) were at the stage of trachomatous inflammation intense (TI), and 3 (6%) had both TF and TI.(Figure 3)

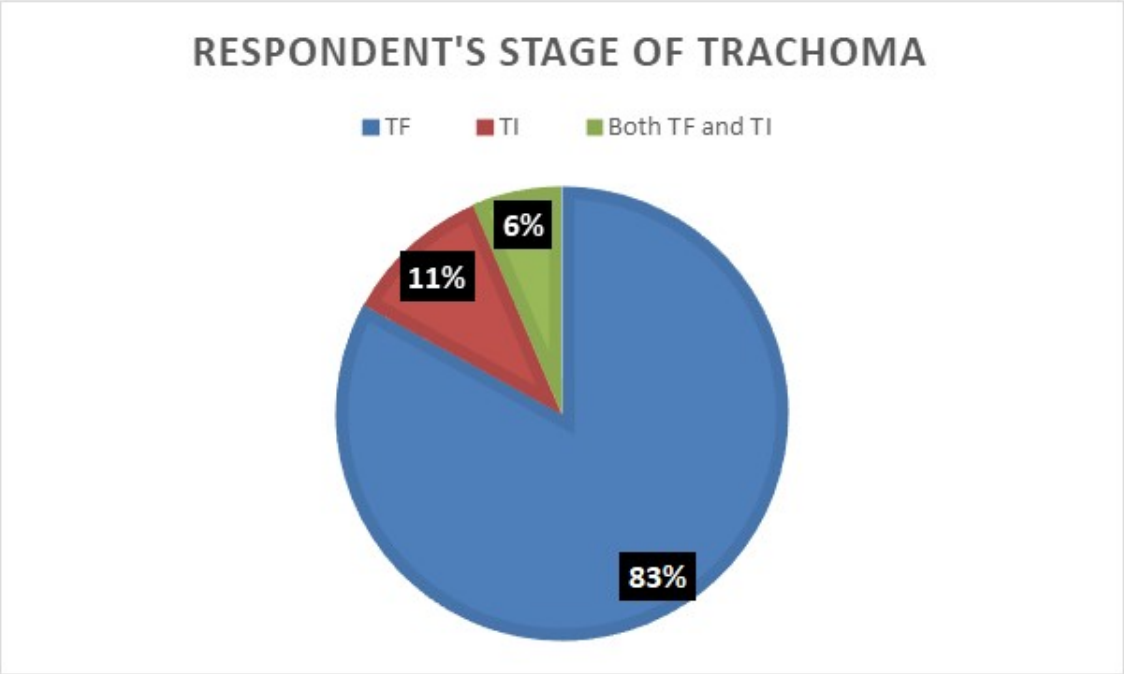

Figure 3: Respondent's Stage of trachoma in Kombolcha district, South east Ethiopia, December, 2021 (n=47)

Bivariate analysis

During bivariate analysis, the following factors were significantly associated with active trachoma infection at a p-value < 0.01:

* Using an unprotected water source

* Sharing a common towel

* Having an eye problem in the family

The following factors were significantly associated with active trachoma at a p-value < 0.05:

* Child's age less than 5 years

* Not washing face with soap

Being female was significantly associated with active trachoma at a p-value < 0.20.

Table 3: Bivariate analysis on factor associated with active trachoma among children of 1-9 years in rural communities of ko-molcha district, December, 2021 (n= 622)

Characteristics		NTRN. (%)	TRN. (%)	COR (95% CI)	P-Value
Child's Sex	*Male*	257(93.5)	18 (6.5)	1	
	Female	318(91.6)	29(8.4)	1.8(0.84 -3.83)	0.135
Child's Age	*1-4 year*	216(97.35)	6(27)	1	
	≥ 5 *years*	359(89.8)	41(10.3)	2.6 (1.0 - 6.62)	0.049
Water source	Protected	493(95.4)	24(4.6)	1	
	Unprotected	82(78.1)	23(21.9)	2.8(1.32 - 6.1)	0.008
Hygienic condition of the child's face	Clean	467(95.3)	23(4.7)	1	
	Unclean	108(81.8)	24(18.2)	1.55(0.71 - 3.4)	0.28
Towel usage	Common	5(26.3.)	14(73.7)	1	
	None	570(94.5)	33(5.5)	0.12(0.03 - 0.47)	0.002
Washing face by soap	No	144(80.9)	34(19.1)	1	
	Yes	431(97.1)	13(2.9)	0.3(0.12 - 0.81)	0.02
Eye problem in family	Present	65(71.4)	26(28.6)	1	
	Absent	510(96)	21(4)	0.24(0.12 - 0.53)	0.000
Family Size	≤4	358(93.7)	24(6.3)	1	
	≥5	217(90.4)	23(9.6)	1.24(0.59-2.59)	0.56
Face Washing frequency	≤ once a day	290(87.6)	41(12.4)		
	≥ once a day	285(97.9)	6(2.1)	0.66(0.21-2.13)	0.49

COR=Crude Odds Ratio, CIs=Confidence Interval, NTR= No trachoma, TR= Trachoma *Significant at p-value of <0.20 **= Significant at p-value of <0.05, ***= Significant at p-value of <0.01

Factors Associated with Active Trachoma

- Water Source:

* Respondents using protected water sources were 68% less likely to have trachoma infection (AOR=0.32) compared to those using unprotected water sources.

- Toiletry Practices:

* Respondents who shared towels had an eight-fold increased risk of trachoma infection (AOR=8.03) compared to those who did not use towels.

* Respondents who did not use soap to wash their faces were almost five times more likely to have trachoma infection (AOR=4.53) compared to those who used soap.

- Household Factors:

* Individuals with family members who had eye problems had almost five times higher odds of having trachoma infection (AOR=4.76) compared to those whose family members did not have eye problems. (Table 4).

Table 4: Bivariate vs multivariate analysis of independent factor associated with active trachoma among children 1-9 years in rural communities of komolcha district, December, 2021 (n=622)

Characteristics		NTRN. (%)	TRN. (%)	COR (95% CI)	AOR (95% CI)
Child's Sex	*Male*	257(93.5)	18 (6.5)	1	0.56(0.26-1.18)
	Female	318(91.6)	29(8.4)	1.8(0.84 -3.83)	1
Child's Age	*1-4 year*	216(97.35)	6(27)	1	0.39(0.16-1.02)
	≥ 5 *years*	359(89.8)	41(10.3)	2.6 (1.0 - 6.62)	1
Water source	Protected	493(95.4)	24(4.6)	1	0.32(0.15- 0.67) **
	Unprotected	82(78.1)	23(21.9)	2.8(1.32 - 6.1)	1
Towel usage	Common	5(26.3.)	14(73.7)	1	8.03(2.18-29.6)**
	None	570(94.5)	33(5.5)	0.12(0.03 - 0.47)	1
wash face by soap	No	144(80.9)	34(19.1)	1	4.53(2.13-9.63)***
	Yes	431(97.1)	13(2.9)	0.3(0.12 - 0.81)	1
Eye problem in family	Present	65(71.4)	26(28.6)	1	4.76(2.19-10.35)***
	Absent	510(96)	21(4)	0.24(0.12 - 0.53)	1

AOR=Adjusted Odds Ratio, CIs=Confidence Interval, in multivariate analysis. **= Significant at p-value of <0.05, ***= Significant less than <0.01

Discussion

Although trachoma is avoidable, it remains a neglected public health issue owing to few voices speaking out on behalf of people affected by trachoma [18]. Despite the implementation of SAFE strategy (surgery for trichiasis, antibiotics for a ctive disease, facial hygiene, and environmental improvement) to reduce the transmission of the disease in Ethiopia, the prevalence of trachoma is still one of the highest in the region [30]. Therefore, the main purpose of this study was to assess the current status of active, and to identify associated factors among children aged 1–9 years in rural communities of Kombolcha district.

The prevalence of active trachoma among children aged1–9 in the study population was found to be 7.55% (6.27% were TF case, 0.8% were TI case and 0.48 % were both TF and TI case), which is higher than the WHO trachoma elimination target (a prevalence of active trachoma (grade TF) in children aged 1–9 years of < 5%) [31], The current finding was significantly lower than the prevalence of TF in children aged1–9 years by Global Trachoma Mapping Project in the year 2012–2014, which reported the prevalence of TF was 25% in Haramaya, kurfachele and Kombolchadistricts [18]. The low prevalence of TF observed in this study may be due to the woredas mass distribution of azithromycin, together with the complementation the F and E components of the SAFE strategy in Kombolcha district. Moreover, the other possible explanation for this variation may be due to the time gap and sample size dissimilarity.

Moreover, the overall prevalence of active trachoma among children aged 1- 9 year in this study was lowas compared to other studies conducted in Ankober, North Shewa (53.9%), Baso Liben,West Gojjam (24.1%), and Kersa,Jimma Zone (25.2%) [2]. Gazegibela district, Amhara region52.4%, Dalocha district, central Ethiopia 51.5%, Oromia regional state 23.4%,children in Ethiopia 26.9%, prevalence [18, 32, 33] and in other African country such as Cameroon (11.2%), Malawi (13.6%), Nigeria

(37.7%) and Niger (23.4%) [9, 34]. This discrepancy in the magnitude of active trachoma could be due to infrastructure and health service coverage difference, in addition to latrine availability(24% in Ankober, 10% in Kersa) and poor availability and accessibility of water (89% of study households in Kersa travel >30 minutes walking distance to get water), mass drug distribution and difference in personal and environmental factors

On the other hand, this study finding was found to be higher than previous studies conducted in Harari region 1.3% and Dire Dawa 4.3% [35] as well as other African studies conducted in Gambia (3.8%) and Sierra Lion (5%). The difference could be explained by the following reasons:the study conducted in Sierra Lion reported low prevalence face and good personal hygiene. In Gambia there was 98% latrine access, 97% of them had disposal pit, and 93% of households move less than 30 minutes to get water [36].

In multivariable logistic regression analysis, a significant association was observed between the presence of active trachoma and source of drinking water, common usage of towel, Existence of Eye problem in family and parent-reported the use of soap when face washed. This risk factors for the development of trachoma were also compatible with other studies in other parts of the country. For instance, this study result revealed that children belong to household's used protected water source was 68% less likely to experience trachoma infection as compared to those who used unprotected water source [AOR=0.32, 95% CI: (0.15- 0.67)].In agreement with these finding studies from Gazegibela district (north Ethiopia(32) and Madda Walabu district (South east Ethiopia)(37)documented the importance of water source on the prevalence of trachoma. Unrelated findings have also been documented in north and south Wollo Zones of Amhara region(38)This could be due to water source are important in the study area, when compared to other factors for the transmission of active trachoma.

The odds of having active trachoma among children from households that used towel were more than eight times higher than their counterparts. In support of this,other studies also reported a similar finding Moreover, the odds of infecting with active trachoma among individuals whose family member experienced Eye problem was almost five-fold higher than those whose family members have no any eye problem.

The use of soap for face washing has been important factors in the prevalence of active trachoma. The odds of having trachoma among children who did not used soap when washed their face had almost five times higher compared to those use soap during washing. Four times higher comparedto those use soap during washing. A comparable finding also reported from other previously conducted studies [37]. Similar findings have also been documented in Wereilu district [25]. Hence, improving community hygiene practice through awareness creation activities is very crucial.

The result of this study indicated that the risk of trachoma increases as the distance of Water source from home becomes longer than half an hour. The risk of acquiring trachoma for households longer than ½ an hour away from water source was found to be almost twice that of nearest houses in this study. The finding of the current study as well as most of previous studies in children indicated that active trachoma was higher than 20%, suggesting a public health problem in rural Ethiopia. The results of current study showed no difference in magnitude of active infection between males and females of age less than 10 years. This is similar to study findings from other parts of the country and from different countries in the world.

Conclusion

Eye problem in family, wash face by soap, towel usage and water were significant factors for active trachoma children in kombolcha district. This study revealed that the overall prevalence of active trachoma among children was high. The prevalence of active trachoma among rural communities of children aged 1–9 years was found to be low in reference to WHO recommended thresholds to initiate trachoma control recommendation (>10 % prevalence), whoever it indicates that active trachoma is still a

major public health concern in the study area. Therefore, it is recommended that coordinated work on implementing the WHO endorsed SAFE strategy in particular and enhancing the overall living conditions of the community is crucial. Trachoma is less common in areas where water is easily accessible. Good face washing habit in children reduces transmission of active trachoma.

Declarations

Ethics approval and consent to participate

This research was approved by Institutional Review Board of Arsi University College of Health Sciences

Consent for publication

This section is not applicable because the research does not include individuals' image or videos.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' contributions

TAM=Original draft preparation,Conceptualization,Methodology,Investigation,data curation,

MTA= Conceptualization,Methodology, Analysis,data curation,

AKT= Methodology,Review and editing

TKB= Original draft preparation, Conceptualization, Methodology, Review and editing DB=Analysis,Methodology, Review and editing

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