

Magnitude of trachoma cases and associated factors among ophthalmic clients attending Menelik II Comprehensive Referral hospital, Addis Ababa, Ethiopia

Getacher Gebeyehu¹, Samson Mideksa², Abdu Oumer³ and Kedir Abegaz⁴

¹Quality Improvement Department head at Kotebe Health Center, yeka sub city, Addis Ababa, Ethiopia

²Food Science and Nutrition Research Directorate of the Ethiopian Public Health Institute, Addis Ababa, Ethiopia

³Department of Public Health, College of Medicine and Health Sciences, Wolkite University, Southwest, Ethiopia

⁴Department of Biostatistics and Health Informatics, Madda Walabu University, Robe, Ethiopia.

*Corresponding author. Email: getacherg12@gmail.com

Abstract

Background: Trachoma is the most common infectious cause of blindness worldwide, with an estimated 229 million people in 53 countries living in trachoma-endemic areas. It continues to be endemic in many developing countries like Ethiopia, with more than 76 million people living with trachoma in various parts of the country. So far, no study has been conducted in the study area.

Objective: To assess the magnitude of trachoma cases and associated factors among ophthalmic clients attending Menelik II Comprehensive Specialized Hospital, Addis Ababa, Ethiopia, 2022.

Methods: A hospital based cross-sectional study was employed in Menelik II Comprehensive specialized Hospital from July 1 to August 1, 2022. Systematic random sampling technique was used to select 607 study participants. Data was collected using a structured questionnaire through face-to-face interview and clinical examination. Data was coded and entered to Epi-info version 7.25 and exported to SPSS version 23 for cleaning and analysis. Multivariable logistic regression analysis was used to identify the independently associated factors.

Result: This result revealed that 8.4% of ophthalmic clients have Trachomatous Trichiasis (95% CI: 6.1%-10.6%). Additionally, Trachomatous Scar (2.5%), Trachomatous Follicle (1.8%), and Corneal Opacity (6.1%) were also found in Menelik II comprehensive specialized hospital. Those who were lacking the kitchen (AOR= 0.147, 95% CI 0.05–0.40); presence of trash within the compound (AOR =1.86, 95% CI 1.2-2.8), flies on a child's face (AOR =3.14, 95% CI 1.2–8.3), clients without latrine utilization (AOR= 0.56, 95% CI 0.3-0.9), and daily laborers (AOR= 2.09, 95% CI 1.3-3.2) were independent predictors of trachoma.

Conclusions: The magnitude of trachoma was low. Those who had the absence of proper kitchen facilities, being a daily laborer, the presence of trash in the compound, and the presence of flies on a child's face and without latrine utilization were more likely to be affected by trachoma. Therefore, by implementing preventive measures such as improved hygiene practices, regular eye examinations, and access to clean water and sanitation, trachoma can be effectively controlled and even eliminated.

Keywords: Trachoma, personal hygiene, Menelik II comprehensive specialized hospital

Introduction

Trachoma is a neglected tropical disease and the leading infectious cause of blindness (Flaxman et al. 2017). The disease is caused by certain serovars of the bacterium *Chlamydia trachomatis*, which are transmitted within ocular and nasal secretions passed from person to person on fingers, fomites (such as clothing), and eye-seeking flies (particularly *Musca sorbens* (Last et al. 2020)). Trachoma is hyper endemic in most rural area of Africa, central and south America, Asia, Australia and the middle East. The distribution of trachoma corresponded with that of poverty in much of Africa and Asia resulting in reduction of trachoma elimination and standard of treatment (Hotez et al. 2014). Prompt trichiasis intervention is needed both to prevent vision loss and to alleviate physical and psychological suffering, social exclusion and improve overall well-being (Habtamu et al. 2015). In 2021, in the 26 countries of Africa Region in which trachoma

is known to be a public health problem, more than 58,760 people with trichiasis were given operations, and more than 79 million people were treated with antibiotics (Clark et al. 2021).

In 2021, the world health organization reported that almost 460,000 people in Ethiopia require surgery to treat trachomatous trichiasis (TT) (Pavlinac et al. 2017).

Trachoma Trichiasis is prevalent in areas where community hygiene is poor, and it mainly affects impoverished and disempowered classes of a community (Harding-Esch et al. 2023). Poor water supply, lack of latrine, garbage disposal facilities and poor indoor air quality and the presence of animals inside residential houses have been reported to be risk factors for the occurrence of trachoma (Sillah et al. 2021). The magnitude of trachoma in under 9 years is 5% (Mengistu et al. 2022), in Mojo, Lume district is 12% (Yalew, Mekonnen, and Jemaneh 2012),

in Aris zone is 18.8% (Mekonnen et al. 2022), and in Addis Ababa is 0.95% (Gebrie et al. 2019).

Although the Ethiopian Federal Ministry of Health has made significant progress in scaling up all components of the WHO-endorsed SAFE strategy (surgery, antibiotics, facial cleanliness, and environmental improvement), efforts to reduce the TT backlog are complicated by the remoteness of the communities affected by the disease. Similarly, there were limited access to health services, and inadequate human resources for eye health to provide standardized TT surgery training and high-quality treatment (Harding-Esch et al. 2023). Hence, the aim of this study was to assess the magnitude of trachoma cases, and associated factors among ophthalmic patients in Menelik II Comprehensive Specialized Hospital (MIICSH).

Materials and method

Study setting: The study was conducted in Menelik II Comprehensive specialized Hospital, which is located in Yeka Sub city, Addis Ababa.

$$N_1 = \frac{(z\alpha/2)^2 * p_1 (1-p_1)}{d^2}$$

$$N_2 = \frac{(z\alpha/2)^2 * p_2 (1-p_2)}{d^2}$$

$$N_3 = \frac{(z\alpha/2)^2 * p_3 (1-p_3)}{d^2}$$

$$n_1 = \frac{(1.96)^2 * 0.12(1-0.12)}{(0.03)^2}$$

$$n_2 = \frac{(1.96)^2 * 0.1525(1-0.1525)}{(0.03)^2}$$

$$n_3 = \frac{(1.96)^2 * 0.0095(1-0.0095)}{(0.03)^2}$$

$$n_1 = 450$$

$$n_2 = 552 \text{ (to have large sample size)}$$

$$n_3 = 40 \text{ (too small)}$$

The sample size determined to take the options of Tora district hospital due to its larger sample size. Adding non response rate 10% = 55 on n_2 , the final sample size become 607.

Sampling procedure: A systematic random sampling technique was employed in order to select the study participants. At first stage, ophthalmic clients at all age groups were identified from ophthalmic triage from the registration folder through discussion with ophthalmic nurses. The first clients were selected using a lottery method and from that systematically continued by visiting every 5th with a K interval of 52. During the time of data

It is the first hospital in Ethiopia serving the society for years specially known for tertiary eye care and forensic medicine.

Study period: A Hospital based cross-sectional study was conducted among ophthalmic clients attending Menelik II comprehensive specialized hospital, from July 1 to Aug 1, 2022. Clients in all age groups, coming in the ophthalmic unit during the data collection period were included in the study. Those who were critically ill and having cognitive impairment were excluded.

Sample size determination: The sample determination for ophthalmic patients was determine using a single population formula with marginal error (d) that would tolerate in either side of true proportional to be 3% and using 95% confidence level = 0.05 and study conducted at Mojo, Lume district hospital before p_1 was 12% (Yalew, Mekonnen, and Jemaneh 2012). Studies conducted in Tora districts Hospital before p_2 was 15.25% (Kedir et al. 2021). Finally, study conducted at Addis Ababa before p_3 was 0.95% (Gebrie et al. 2019).

collection, when the respondent was not available, the next client was considered.

Operational definition

Data collection tool: Data was collected using a structured questionnaire in face-to-face interviews, and observation (clinical eye examination techniques). The questionnaire was translated from English to Amharic and then back to English to ensure consistency. Clinical eye examinations for each client were conducted by carefully inspecting eyelashes, cornea, limbus, eversion of the upper eyelids, and inspecting the upper tarsal conjunctiva. It was conducted with the help of a magnifying binocular vision loupe (3.5x for adults and 2.5x for children), with utrocular (both eyes stimulated by light), and dominance (the habit of using one eye when aiming at something, even if both eyes are open). Furthermore, the examiner should avert the eye lid of the patient to examine the conjunctiva to check the presence and absence of active trachoma. The study used trained ophthalmic nurses to assist with field diagnosis of Trachoma. Generally, the TT is defined as either any lash touching the globe or showing evidence of epilation. Epilation is a common traditional practice of intermittent plucking of lashes touching the eye. However, its long-term effectiveness in preventing visual impairment is unknown. Trachomatous inflammation is follicular presence of 5 or more follicles each at least (0.5mm in diameter) on the central part of the upper tarsal conjunctiva. Reaped bouts can lead to scar, trichiasis and opacity. The ophthalmic nurses are able to correctly diagnose

the presence of TT, TS, TF and CO using WHO grading systems with additional assessment of entropies grading, location and number of trichiasis lashes, and evidence of epilation. For those who had trachoma cases among ophthalmic patients, they were treated with 1% TTC eye ointment. The examiner clean hands with disinfectant solution (Alcohol) in each examination of patient eyes.

Active trachoma: is chronic inflammation of the conjunctiva caused by infection with Chlamydia trachomatis. The WHO simplified trachoma grading scheme defines active trachoma as TF and/or TI, where TF(trachomatous inflammation - follicular) is the presence of five or more follicles in the central part of the upper tarsal conjunctiva, each at least 0.5 mm in diameter, and TI (trachomatous inflammation-intense) is pronounced inflammatory thickening of the upper tarsal conjunctiva that obscures more than half of the normal deep vessels (Klein, Good, and Christie 2024).

Blinding Trachoma: includes Trachomatous scarring (TS), Trachomatous trichiasis (TT) and corneal opacity (CO) grades of trachoma (Kebede and Jamal 2023).

Endemic trachoma: is defined as the prevalence of active trachoma of 5% or more in children aged one to nine years or a prevalence of trichiasis of at least 0.1% in the adult population which is also known as blinding endemic trachoma.

Trachomatous Inflammation Intense (TI): is pronounced inflammatory thickening of the tarsal conjunctiva that obscures more than half of the normal deep tarsal vessels(Nash et al. 2023).

Trachomatous Scarring (TS): presence of scarring in the tarsal conjunctiva.

Trachomatous Trichiasis (TT): at least one eyelash rubs on the eyeball or there is evidence of recent removal of in-turned eyelashes(Gupta et al. 2022) .

Magnitude of active trachoma: includes active trachoma detected by trachoma screening programs and, in some circumstances, cases detected in hospital.

Data quality assurance: Quantitative data was conducted by four medical ophthalmic assistants (data collectors) with one ophthalmic nurse (supervisors) in hospital. Before starting the field work one day orientation was given who was certified by trachoma grading. Pretest was conducted with sixty (10%) individuals in Eka Kotebe General Hospital of global ophthalmic

clinic. This is to ensure consistency measure (reliability) of the study variables. The necessary corrections, adjustments, and rephrasing of questions were done after validity and reliability test.

Data processing and analysis: The collected data was cleaned code and entered to the Epi-info version 7.25 and then exported to SPSS version 23. Descriptive statistics like frequency and cross tabulation used to present the result findings. Bivariate analysis was done for all explanatory variables concerning the associated factors of trachoma cases. Variables with p-value < 0.25 in the bivariate analysis were selected for the multivariate logistic regression model for adjustment of confounding effects between explanatory variables. Adjusted odds ratio with 95% confidence interval was computed and variables having p-value less than 0.05 in the multivariate logistic regression model were considered as statistically significant for the associated factors of trachoma cases.

Ethical consideration: Ethical clearance was initially obtained from Addis Ababa Regional Health Bureau Research Center. Official letter was written to MIICSH, and then informed verbal consent from patients/care takers of children who sought brief explanations of the purpose of the study of trachoma magnitude, and associated factors.

Results

Socio-demographic characteristics: As described in Table 1, a total of 607 cases participated in this study. Of these, 90 participants (15%) were aged 1-10, 120 participants (19.8%) were in the age of 40-49 years, and 197 (32%) in the age of >50 years. As well, the majority of the respondents 383 (63.1%) had secondary and above education compared with 55 (9%) who had no formal education. The proportion of respondents who reported having attained primary level of education was 169 (27.8%). In addition, the majority of the respondents 319(52.6%) were married.

The findings of the study reveal that majority of the respondents 172 (28.3%) were daily laborer, 132 (21.9%) were housewives, and 130 (21.4%) participants were reported being employed. Beside these, majority of the respondent income level < 1500 were 295(48.6%) and >1501(51.4%). Female were 350(57.7%) respondents and majority of the respondents 438 (72.2%) had 4 and more children (Table 1).

Table 1: Socio Demographic characteristics of ophthalmic patients at Menelik II Comprehensive Specialized Hospital, 2022, (N=607)

Variables	Frequency	Percent
Age in range		
1-10	90	15
11-19	39	6.4
20-29	64	10.5
30-39	97	16
40-49	120	19.8
50 years	197	32
Occupational level		
Farmer	28	4.6
Craftsmen	17	2.8
Merchant	75	12.4
Housewife	132	21.9
Retired	53	8.6
Employee	130	21.4
Daily laborer	172	28.3
Marital status		
Married	319	52.6
Not married	288	47.4
Family size		
3 and less	169	27.2
4 and more	438	72.2
Educational level		
Secondary and above	383	63.1
No formal education	55	9.1
Primary school	169	27.8
Income status		
≤1500	295	48.6
≥1501	312	51.4
Sex		
Male	257	42.3
Female	350	57.7
Total	607	100

Around 38% of the study respondents reported washing their faces with soap every morning and 62.1% not washed their face with soap.

Concerning frequency, 56.8% and 40.9% of the participants wash their face rarely and once a day respectively (Table 2).

Table 2: Personal hygiene factors of ophthalmic out patients at Menelik II comprehensive specialized hospital, 2022, (n=607)

Variable	Frequency	Percent
Use soap when washing		
Yes	230	37.9
No	377	62.1
Facial cleanness		
Yes	233	38.4
No	374	61.6
Frequency of face wash		
Once per day	248	40.9
Rarely	345	56.8
2-6 day per week	2	0.3
Once per week	5	0.8
Unwashed face	7	1.2
Total	607	100

Environmental factors associated to trachoma infections: Majority of the respondent 385 (63.4%) individual had trash compounds and 222 (36.6%) of respondent absent of trash compound.

But 44(7.2%) of respondent have animal dung in the compound. There were 96 (15.8%) respondents shown flies on the face from the trash compound and animal dung (table 3).

Table 3: Environmental factors associated to trachoma infection of ophthalmic out patients at Menelik II Comprehensive Specialized Hospital, 2022, (N=607)

Animal dung	Frequency	Percent
Yes	44	7.2
No	563	92.8
Trash of compound	Frequency	Percent
Present	385	63.4
Absent	222	36.6
Flies on face	Frequency	Percent
Yes	96	15.8
No	511	84.2
Total	607	100

Magnitude of trachoma cases in ophthalmic clients at Ophthalmology Department of Menelik II Comprehensive Specialized Hospital: Results presented in Table 4 on field

diagnosis shows the magnitude of trachoma. The prevalence of TT were 51(8.4%), TS were 15(2.5%), TF were 11(1.8%) and CO were 37(6.1%).

Table 4: Magnitude of trachoma cases in ophthalmic clients at Ophthalmology Department of Menelik II Comprehensive Specialized Hospital, 2022, (N=607)

Stage of trachoma	Frequency		Total
	Female	Male	
TF/TFI	5(1.4%)	6(2.3%)	11 (1.8%)
TS	11 (3.1%)	4 (1.6%)	15(2.5%)
TT	22(6.3%)	29(11.3%)	51(8.4%)
CO	17 (4.9%)	20 (7.8%)	37 (6.1%)

Associated factors of trachoma cases: After adjusting for socio-demographic factors, personal hygiene and environmental related factors the multivariable logistic regression analyzed. It was

identified the presence of flies on a child's face, being a daily laborer, the presence of trash in the compound, without latrine utilization and the absence of proper kitchen facilities found to be as independent predictors for trachoma cases.

Table 5: Risk factors of trachoma in ophthalmic clients determined through bivariable and multivariable logistic regression at Menelik II Comprehensive Specialized Hospital, 2022, (N=607)

Multivariable logistic Regression of Trachoma in Comprehensive Upazila Hospital, 2022, (N= 507)									
Variables	Magnitude of Trachoma		Bivariate LR				Multi variable logistic LR		
			CO R	95%CI	P-value	AOR	95%CI	P-value	
Sex	Male	199	54	1.32	0.4-1.1	0.172	0.75	0.4-1.03	0.065
	Female	294	60	1	1	1	1		1
Flies on children face	Yes	90	6	0.24	1.7-9.43	0.001	3.14	1.2-8.3	0.008**
	No	403	108		1	1	1	1	1
Trash compound	Present	328	57	0.5	1.3-3.0	0.001	1.86	1.2-2.8	0.005**
	Absent	165	57						
Latrine utilization	yes	312	85	1.71	0.37-0.93	0.024	0.56	0.3-0.9	0.021**
	No	181	29	1	1	1	1	1	1
Place of cooking	Not kitchen	9	11	4.2	0.07-0.43	0.001	0.14	0.05-0.4	0.001**
	Kitchen	483	139	1	1	1	1	1	1
Occupational status	Daily Laborer	364	61	0.4	1.6-3.7	0.001	2.09	1.3-3.2	0.001**
	Employer	129	53	1	1	1	1	1	1
Marital status	Married	248	71	1.63	1.07-2.47	0.022	1.32	0.8-2.0	0.24
	Unmarried	245	43	1	1	1	1	1	1

Accordingly, the odds of having trachoma were 3.4 (AOR=3.14, 95% CI: 1.39-8.56) times higher among children with presence of flies on a child's face. Likewise, the odds of having trachoma were 2.09 (AOR= 2.09, 95% CI 1.3-3.2) times higher among clients from hospital who had trash in their compounds. The odds of having trachoma were 0.56(AOR =0.56, 95% CI 0.3-0.9) times lowered among clients who were not utilizing latrine. The odds of having trachoma were also 0.147 (AOR =0.147, 95% CI 0.05–0.40) times lowered among clients who had the absence of proper kitchen facilities (Table 5).

Discussions

The overall magnitude of trachoma at Menelik II Comprehensive Specialized Hospital is 8.4% of TT, TF/TI (1.8%), CO (6.1%), and TS (2.5%). And the magnitude of active trachoma is 1.8% while the chronic trachoma magnitude TT is 8.4% and corneal opacity is 6.1%. This can be attributed to the fact that the study includes only the ophthalmic patients where the health service facilities are given and who had a history of eye problems.

These findings are lower prevalent with Trachoma Trichiasis in areas where western Turkana 13.3%. Their community hygiene is poor, and it mainly affects impoverished and disempowered classes of a community (Harding-Esch et al. 2023). This finding is lower than study done in Tora primary hospital, Silte Zone. Overall, the prevalence of active trachoma was 29.4% due to absence of latrine, facial uncleanliness and no reported use of soap for washing are factors associated with active trachoma (Kedir et al. 2021). Similarly, the clinical based survey conducted in a refugee camp serving South Sudan refugee camp in 2019 showed also greater than this study. The result shows that the hyper endemic for trachoma was the cause of TT in 14.6% of all patients who visited the refugees.

Of these, 90 (15%) participants were aged 1-10, 39 (6.4%) participants were aged 11-19, 64 (10.5%) participants were aged 20-29, and 97 (16%) participants were aged 30-39. A further 120 (19.8%) participants were in the age bracket of 40-49 years, whereas 197 (32%) represented the age of ≥ 50 years. This shows that the study covered all age groups of the respondents. These findings are consistent with a study by Congdon, which showed that children and women are the major reservoirs of the bacteria for the infective trachoma. Children cannot take care of themselves and are therefore affected more because this group is characterized by unclean faces, nasal discharges, foods on the faces and

dust that attract eye-seeking flies, which are the bacteria carriers (Burton et al. 2021).

The study reveals that there exists a relationship between active trachoma and non-accessibility to protected water sources. This result is similar with previous work in Ankober, in which it is shown that due to inaccessibility to protected water sources and frequently exposed water surfaces. In addition, risk factors for contamination as well as presence of high number of eye flies lead to high chances of trachoma transmission (Golovaty et al. 2009). On the other hand, the study of Scheming et al. in Mali shows that families with easy access to a water source tended to use more water for bathing and other hygienic purposes such as laundry. Hence reducing chances of trachoma infections (Issifou et al. 2023).

In the present study, it was found that there existed significant association between active trachoma and unclean faces. This finding is similar to studies that identify the presence of ocular and nasal discharge as risk factors for the presence of fly on eyes and active trachoma in Tanzania (Mohammadpour et al. 2016). Similarly, the presence of more flies on faces was associated with more chances of having active trachoma. This finding is also consistent with different investigations in Tanzania, Gambia and Ethiopia (Burton et al. 2021). The possible explanations of these could be the role of eye-seeking flies in trachoma transmission, which have still remained common and high.

Some of the respondents in this study keep animals in their living rooms or enclosures. The literature reviewed for this study shows that flies are more likely to breed and be attracted to landfills, excrement containing cow dung, and rotten food. Environmental and social variables that have been shown to be risk factors for trachoma sustainability include heat and aridity, considerable distances from water sources and scarcity of water as discussed in the results of this study, no latrines utilization, absence of separate kitchen, presence of trash in the compound, daily laborers and presence of flies in the child face were a potential risk factors for trachoma cases. However, Emerson et. al., stated that such correlations might simply be proxies for poverty, and that trachoma is not just a disease of hot and arid locations (Mohammadpour et al. 2016).

Conclusion and recommendation

The magnitude of trachoma was low. Absence of proper kitchen facilities, being a daily laborer, the presence of trash in the compound, and the presence of flies on a child's face and without latrine utilization were independent risk factors for trachoma. Therefore, by implementing

preventive measures such as improved hygiene practices, regular eye examinations, and access to clean water and sanitation, trachoma can be effectively controlled and even eliminated.

Availability of data and material's statement:

The dataset generated and/or analyzed during the current study interviewed /examined clients will be shared with a reasonable request.

Competing interests: The authors declare that they have no competing interest. All authors agreed on the submission of the manuscript.

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Consent for publication

Not applicable

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