

Prevalence of Trachoma and Associated Risk Factors among Yello Elementary School Students, In Loma Woreda, Dawro Zone, Ethiopia, 2015

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Abstract

Background: Trachoma is a communicable disease and usually has chronic course. It greatly affects children below age of 10 and especially school and preschool children. It is the leading cause of preventable blindness in developing countries and particularly main cause for blindness in Ethiopia.

Methods: A cross-sectional school based study design was conducted among Yello elementary school students in March 2015. A sample of 267 students were involved in the study by stratified sampling technique and finally selected by systematic random sampling. Data collection tool were structured questionnaires and check lists for eye examination. The data were collected by health professionals, then processed and analyzed manually using tally sheet and scientific calculator. Possible associations and statistical significance between and among variables were measured using chi-square test, P value <0.05 was used to declare statistical significance.

Result: From the total of 267 study population, 61 (22.85%) of children had signs of trachoma and it was mainly associated to age ($X^2 = 18.4$, $P = 0.000$) with more prevalence among age group 7-9 (75.38%).

Variables such as age, face washing habit, practice of towel usage, eye problem in the family, and site of waste disposal were statistically associated with trachoma at ($P = 0.000$). More over mothers and fathers literacy status hadn't contribute to trachoma morbidity with ($P = 0.793$).

Conclusion: Findings of this study support majority of ideas that are commonly accepted as transmission factors of the disease except some. Trachoma had significant association with age, face washing habit, towel usage practice, history of eye problem in the family and site of waste disposal. Promotion of health information on prevention of trachoma at community and institution level with emphasis for children and women should be given. Early case identification and treatment by health sector and inter-sectional collaboration with others against trachoma is crucial.

Keywords: Trachoma; Infectious eye disease; *Chlamydia trachomatis*; Trichiasis

Lists of Abbreviations

AOR- Adjusted Odds Ratio; BSc - Bachelor of Science; CI- Confidence Interval; CO - Corneal opacity; GET - Global Elimination of Blinding Trachoma; IAPB - International Agency for Prevention of Blindness; ITI- International Trachoma Initiative; MOH - Ministry of Health; NTDs - Neglected Tropical Diseases; OR- Odds Ratio; P - Prevalence; SAFE - Surgery, Antibiotics, Face hygiene and Environmental sanitation; SNNPRS - Southern Nation Nationalities People Regional State; TF - Trachomatous inflammation-follicular; TI- Trachomatous inflammation-intense; TS - Trachomatous scarring; TT- Trachomatous trichiasis; WHO - World Health organization; X2 - Chi square

Introduction

Trachoma is a form of kerato-conjunctivitis which is communicable and usually has chronic course. Its causative agent bacterial *Chlamydia trachomatis* spreads through contact with eye discharge from the infected person (on towels, hand kerchiefs, fingers, etc.) and through transmission by eye-seeking flies. The distribution over the eye ranges from conjunctivitis (of the follicular) to most disabling forms of trichiasis formation, corneal scarring, complete corneal opacity and blindness [1].

Trachoma was eliminated from developed countries through improvements of hygiene and sanitation but still a problem of developing countries. It is endemic in more than 50 countries. According to the WHO (2007) report, globally close to 1.3 million people are blind due to trachoma, while about 84 million people suffer from active trachoma (Trachomatous inflammation, follicular (TF) and/or intense (TI)). Active infection is mostly seen in young children

with a peak incidence of around four to six years, while subsequent scarring and blindness is seen in adults [2].

The national survey (2007) of Ethiopia showed a prevalence of 40.1% active trachoma among children aged 1–9 years. Amhara region had the highest prevalence of active trachoma among children aged 1–9 years (62.6%) and trichiasis in 15 years and above adults (5.2%) [3].

The bacteria that cause the disease can be spread by both direct and indirect contact with an affected person's eyes or nose. Indirect contact includes through clothing or flies that have come into contact with an affected person's eyes or nose. Many infections are usually needed over a period of years before scarring of the eyelid becomes so great that the eyelashes begin to rub against the eye. Children spread the disease more often than adults. Poor sanitation, crowded living conditions, and not enough clean water and toilets also increase spread [4].

Trachoma spreads easily, primarily from child to child, and child to caregiver. The infection starts in young children and heals after a couple of months. However, after years of repeated infection, the inside of the eyelid may be scarred so severely that the eyelid turns inward and the lashes rub on the eyeball, scarring the cornea (the front clear part of the eye). If untreated, this condition leads to the formation of irreversible corneal opacities and blindness. Blindness occurs usually in adult hood; however blindness from trachoma has also been seen in children much younger. Though trachoma is widespread, it is also little-known outside of affected communities. Trachoma mainly thrives in isolated rural communities where people live with limited access to water and health care. In some communities, the disease is so common that blindness from trachoma is simply accepted as a fact of life [5].

Trachoma occurs in areas with poor personal and family hygiene. Many factors are indirectly linked to the presence of trachoma including lack of water, absence of latrines or toilets, poverty in general, flies, close proximity to cattle, crowding, and so forth. However, the final common pathway seems to be the presence of dirty faces in children that facilitates the frequent exchange of infected ocular discharge from one child's face to another. Most transmission of trachoma occurs within the family [6].

Although effective prevention strategies and treatment are available, trachoma still remains the major cause of infectious blindness worldwide [7]. The 2014 estimate for the global population at risk of trachoma is 232 million; 29 countries of Africa are thought to be endemic and they account for 77% of the total population estimated to be living in endemic areas worldwide [8].

Measuring the incidence of blindness from trachoma is technically difficult, but a number of process and outcome indicators are used as proxies to measure progress towards elimination.

The outcome indicator targets for elimination of blinding trachoma as a public health problem are: 1) <1 case of trachomatous trichiasis (TT) unknown to the health system per 1000 total population and 2) a prevalence of the active trachoma sign trachomatous inflammation-follicular (TF) 4 of <5% in children aged 1–9 years [9].

In Ethiopia trachoma is the main cause of blindness accounting for 35% of all causes of blindness. In addition to its severe damage to eye, trachoma has social, psychological, physiological, educational and economic impacts to the individual family and community. Blindness, as part from the stigma it brings on the individual socio-economic impact on the development of the given country. Rehabilitation and education of the blind bring significant economic burden particularly among developing countries like Ethiopia [10].

Therefore, it is logical to give emphasis on this case pertaining to its prevalence studies searching for and avoiding risk factors and early treatment, so that the long term outcome can be prevented. This can be achieved by long term objective of eliminating and control of trachoma through the action of combination of prevention strategies aimed at antibiotics, facial hygiene and environmental improvement [11].

Therefore identifying the prevalence of trachoma and associated risk factors in elementary school children is one promising strategy to further reduce trachoma transmission.

Materials and Methods

An institution based cross-sectional study design was conducted at Yello Elementary school, in Yello Lala Kebele, Loma Woreda, Dawro Zone from March 02/2015 to March 06/2015. Yello elementary school had a total of 876 students registered on the 2014/ 2015 first half academic year which include grade 1 up to grade 8. The single population formula was used to calculate a sample size, by using 50% of the proportion of expected prevalence of trachoma among elementary school students. Stratified sampling technique was used for allocating a probability proportionate to sample size for each class of students. Finally, study participants were selected from each class through systematic random sampling technique.

Data was collected using structured and semi structured questionnaire. First interview was made based on the structured questionnaire to identify trachoma risk factors at individual level and then, physical examination was proceeded for general inspection of eye and nasal discharge; eye lid, eye lashes and cornea for: entropion, trichiasis, and opacity respectively.

The data was analyzed and processed using scientific calculators so that percentages and rates were identified. Association between variables was done using chi square test. The result was presented in written and different form of presentations like: tables, and charts.

Ethical clearance letter was obtained from ethical review board of Jimma University College of health sciences and had delivered to the study site school director. Explanation about the objective, method as well as the benefit of the study was given to the study population for their full-co-operation.

Result

Socio-demographic factors

Students involved in the study were 267 in which most of their age is in a range of 10-14years (37.45%), and most of their families occupation was farmer (43.07%) (Table1).

Socio-demographic characteristics		Number	Percent (%)
Age	7-9years	97	36.33
	10-14years	100	37.45
	15-19years	64	23.97
	>20years	6	2.25
	Total	267	100
Sex	Male	113	42.32
	Female	154	57.68

	Total	267	100
Religion	Protestant	250	93.63
	Orthodox	9	3.37
	Catholic	6	2.25
	Muslim	2	0.75
	Total	267	100
Ethnicity	Dawro	253	94.77
Wolayta	5	1.88	
Amhara	4	1.47	
Others*	5	1.88	
Total	267	100	
Family occupation	Farmer	155	43.07
	Merchant	38	14.24
	Employed	80	29.97
	Daily labor	28	10.46
	Others**	6	2.26
	Total	267	100
Family size	3-Jan	101	37.83
	6-Apr	117	43.82
	9-Jul	31	11.61
	>10	18	6.74
	Total	267	100
Maternal status literacy	Illiterate	71	26.59
	Grade 1-6	116	43.44
	Grade 7-12	61	22.85
	12+	19	7.12
	Total	267	100
Fathers status	Illiterate	70	26.22
	Grade 1-6	103	38.58
	Grade 7-12	68	25.47
	12+	26	9.73
	Total	267	100

Table 1: Distribution of socio- demographic characteristics of the students and their parents of Yello elementary school students in Yello Lala kebele, Loma woreda, Ethiopia 2015; Others (* = Konta, Gurage and Tigre; ** =Private workers)

Care related behaviors and sanitary conditions

Methods of waste disposal were:-Open field 21.72% and pit 78.28%. Large numbers of flies were found around the home 26.5% of houses and no flies in 73.41%. (Table 2).

Characteristics	No	%	
Face washing habit	Some times	7	2.62
	Once per day	24	8.99
	Twice per day	58	21.22
	3 times per day	178	66.67
	Total	267	100
Practice of towel usage	Private	140	52.44
	Common	36	13.48
	None	91	34.08
Total	267	100	
Eye problem in the family	Present	69	25.84
	Absent	198	74.16
	Total	267	100
Overcrowding index	2rooms	39	14.61
	3rooms	56	20.91
	>4 rooms	172	64.42
	Total	267	100
Water Availability	In the compound	44	16.48
	Outside compound	92	34.46
	Communal	131	49.56
	Total	267	100
Time taken to fetch water	< 5min	97	36.33
	6-10min	90	33.7
	11-19min	32	11.99
	>20min	48	17.98
	Total	267	100
Daily household water consumption (L)	<20	90	33.71
	21-40	100	37.45
	41-60	50	18.73
	61-80	17	6.37
	>80	10	3.74
	Total	267	100
	Latrine availability	Yes	237
No		30	11.34
Total		267	100

Site of water disposal	Open field	58	21.72
	Waste disposal pit	209	78.28
	Total	267	100
Many flies (Density)	Yes	71	26.59
	No	196	73.41
	Total	267	100

Table 2: Percentage distribution of students eye care related behaviors and sanitary conditions among Yello elementary school students, Yello Lala kebele, Loma woreda, Ethiopia 2015

Housing condition

House floor was earthen in (77.53%) population. Seventeen percent of the population cook and live in the same (main) room and (82.77%) use different room for cooking. 16.48% of students lived in the same room as the cattle (Table 3).

Housing condition	No	%	
Type of house floor	Cement	44	16.48
	Wooden	12	4.49
	Earthen	207	77.53
	Others*	4	1.5
	Total	267	100
Cooking in the same house	Yes	46	17.23
	No	221	82.77
	Total	261	100
Cattle living with people (in the same house)	Yes	44	16.48
	No	223	83.52
	Total	267	100

Table 3: Percentage Distribution of housing conditions of the students' parents among Yello elementary school students, Yello Lala kebele, Loma woreda, Ethiopia 2015; Others* = Clay, Plastic

Students with signs of trachoma and with no signs of trachoma

From the total of 267 studied population, 61(22.85%) were diagnosed to have signs of trachoma even though 11 students were

Characteristics		Trachoma Grade										total	
		TF		TI		TS		TT		CO			
		No	%	No	%	No	%	No	%	No	%	No	%
Age	7-9years	16	40	8	20	16	40	-	-	-	-	40	55.56
	10-14years	9	39.13	5	21.74	8	34.78	-	-	1	4.135	23	31.94
	15-19years	1	12.5	1	12.5	6	75	-	-	-	-	8	11.11

with mixed signs (TF -Trachomatous inflammation-follicular) And (TI- Trachomatous inflammation-intense), (TF and TS- Trachomatous scarring) look Figure 1.

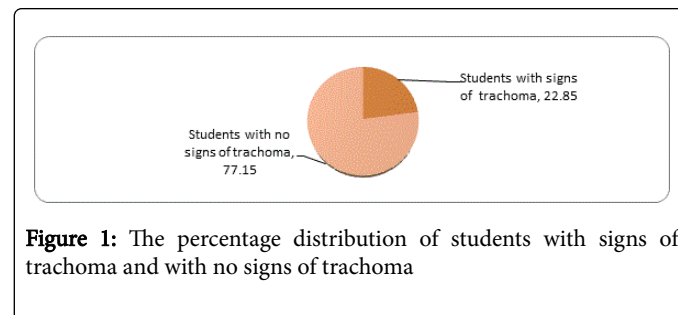


Figure 1: The percentage distribution of students with signs of trachoma and with no signs of trachoma

Trachoma stages distribution by Percentage

The overall prevalence is found to be 22.85% (61), but there were students with mixed symptoms (11 students).TS account the highest percentage (41.67%) from all stages of trachoma followed by TF (37.50%), TI was (19.44%) and CO- Corneal opacity (1.39%) but TT - Trachomatous trichiasis were not diagnosed (Figure 2).

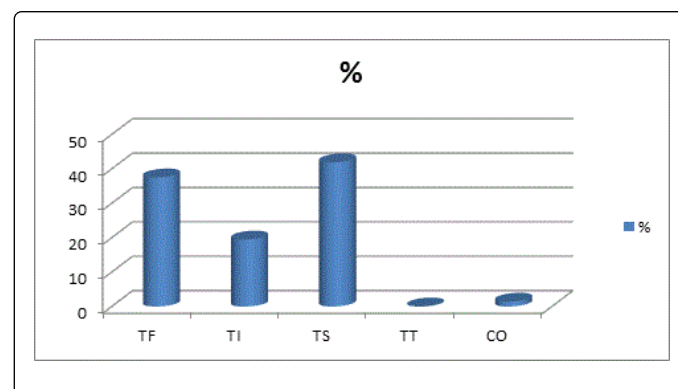


Figure 2: Trachoma stages distribution by Percentage

Relationship of trachoma with risk factors

Trachoma was higher in the age group of 7-9 years, constituting (57.38%) followed by from 10-14 years (32.79%) (Table 4).

	≥20years	1	100	-	-	-	-	-	-	-	-	1	1.39
	Total	27	37.5	14	19.44	30	41.67	-	-	1	1.39	72	100
Sex	Male	9	39.13	4	17.39	10	43.48	-	-	-	-	23	31.94
	Female	18	36.73	10	20.41	20	40.82	-	-	1	2.04	49	68.06
	Total	27	37.5	14	19.44	30	41.87	-	-	1	1.39	72	100

Table 4: Percentage distribution of age and sex of students by grade of trachoma among Yelloelementary school students, Yello Lala kebele, Loma woreda, Ethiopia 2015.

There is a significant association between trachoma morbidity and age distribution ($X^2 = 18.4, P = 0.000$). Trachoma positivity was more seen in females than males (34.43% males and 65.57% females). Mothers and fathers literacy status have no statistical association with trachoma morbidity ($X^2 = 3.92, P = 0.27$) for mothers and $X^2 = 3.37, P = 0.337$ for fathers) (Table 5).

CHARACTERISTICS		TRACHOMA						X2	P- VALUE
		POSITIVE		NEGATIVE		TOTAL			
		No	%	No	%Total	No	%		
Age	7-9 years	35	57.38	62	30.1	97	36.33	18.4	0
	10-14years	20	32.79	80	38.83	100	37.45		
	15-19years	5	8.2	59	28.64	64	23.97		
	≥20years	1	1.63	5	2.43	6	2.25		
	Total	61	100	256	100	267	100		
Sex	Male	21	34.43	92	44.66	113	42.32	2.02	0.155
	Female	40	65.57	114	55.34	154	57.68		
	Total	61	100	206	100	267	100		
Family size	3-Jan	21	34.43	80	38.83	101	37.83	1.04	0.793
	6-Apr	29	47.54	88	42.72	117	43.82		
	9-Jul	8	13.11	23	11.17	31	11.61		
	>10	3	4.92	15	7.28	18	6.74		
	Total	61	100	206	100	267	100		
Mothers literacy status	Illiterate	19	31.15	52	25.24	71	26.59	3.92	0.27
	Grade 1-6	30	49.18	86	41.75	116	43.44		
	Grade7-12	9	14.75	52	25.24	61	22.85		
	12+	3	4.92	16	7.77	19	7.12		
	Total	61	100	206	100	267	100		
Fathers literacy status	Illiterate	21	34.43	49	23.79	70	26.22	3.37	0.337
	Grade 1-6	19	31.15	84	40.78	103	38.58		
	Grade7-12	16	26.22	52	25.24	68	25.47		
	12+	5	8.2	21	10.19	26	9.73		
	Total	61	100	206	100	267	100		

Table 5: Relationship between socio-demographic characteristics and occurrence of trachoma among Yello elementary school students, Yello Lala kebele, Loma woreda, Ethiopia 2015

The highest percentage of trachoma morbidity was seen on those who wash their face once per day (58.33%). The association between face washing habit and trachoma morbidity was statistically significant ($X^2 = 20.8, P= 0.000$). Practice of towel usage also showed statistically significant association with trachoma morbidity ($X^2 = 16.3, P= 0.000$). The positivity was (15.71%) for those who use towel privately (47.22%) for those who use commonly, and (14.18%) for those who do not use it. History of eye problem in their family obtained among (42.03%) positive students, and (16.16%) do not have eye problem in their

family. It also showed statistically significant association with trachoma morbidity ($X^2 = 19.4, P= 0.000$).

Site of waste disposal system showed significant association with trachoma morbidity. It was (32.76%) for open field and (20.10%) for who had waste disposal pit, ($X^2 = 4.13, P= 0.047$). The overcrowding index and availability of toilet showed no statistical significant association with trachoma (Table 6).

EYE CARE RELATED BEHAVIORS AND SANITARY CONDITIONS		TRACHOMA						X2	P-VALUE
		POSITIVE		NEGATIVE		TOTAL			
		No	%	No	%	No	%		
Face washing habit	sometimes	2	3.28	5	2.43	7	2.62	20.8	0
	Once per day	14	22.95	10	4.85	24	8.99		
	Twice per day	15	24.59	43	20.87	58	21.72		
	>3 times per	30	49.18	148	71.85	178	66.67		
	Total	61	100	206	100	267	100		
Towel usage practice	Private	22	36.07	118	57.28	140	52.44	16.3	0
	Common	17	27.86	19	9.22	36	13.48		
	None	22	36.07	69	33.5	91	34.08		
	Total	61	100	206	100	267	100		
Eye problem in the family	Present	29	47.54	40	19.42	69	25.84	19.4	0
	Absent	32	52.46	166	80.58	198	74.16		
	Total	61	100	206	100	267	100		
Over crowded index	2rooms	10	16.39	29	14.08	39	14.61	1.82	0.402
	3rooms	16	26.23	40	19.42	56	20.97		
	>4 rooms	35	57.38	137	66.5	172	64.42		
	Total	61	100	206	100	267	100		
Water Availability	In compound	6	9.83	38	18.45	44	16.48	2.59	0.275
	Outside compound	22	36.07	70	33.98	92	34.46		
	Communal	33	54.1	98	47.57	131	49.66		
	Total	61	100	206	100	267	100		
Latrine availability	Yes	52	85.25	185	89.81	237	88.76	0.981	0.322
	No	9	14.75	21	10.19	30	11.24		
	Total	61	100	256	100	267	100		
Time taken to fetch water	< 5min	20	32.79	77	37.38	97	36.33	1.56	0.669
	6-10 min	24	39.34	66	32.04	90	33.7		
	11-19 min	8	13.11	24	11.65	32	11.99		
	>20 min	9	14.76	39	18.93	48	17.98		
	Total	61	100	256	100	267	100		

Site of waste disposal	Open filed	19	31.15	39	18.93	58	21.72	4.13	0.042
	In waste disposal pit	42	68.82	167	81.07	209	78.28		
	Total	61	100	206	100	267	100		
Presence of many flies(density)	Yes	18	29.51	53	25.73	71	26.59	4.13	0.042
	No	43	70.49	153	74.27	196	73.41		
	Total	61	100	206	200	267	100		

Table 6: Percentage distribution of students eye care related behaviors and sanitary conditions by trachoma, morbidity among Yello elementary school students, Yello Lala kebele, Loma woreda, Ethiopia 2015

Among Respondents, who had trachoma: 61(22.85%), 44(72.13%), 9(14.75%), 5 (8.20%) and 3(4.92%) had type of house floor earthen, cement, wooden and other respectively. Among the positive cases (41.30%) were cooking in the living house and 42(19.00%) cook in different house. Population who were positive to trachoma and live with cattle in the same house were (45.45%) and who live in different house were (18.39%) (Table 7).

HOUSING CONDITION		TRACHOMA					
		POSITIVE		NEGATIVE		TOTAL	
		No.	%	No.	%	No.	%
Type of house floor	Cement	9	14.75	35	16.99	44	16.48
	Wooden	5	8.2	7	3.4	12	4.49
	Earthen	44	72.13	163	79.13	207	77.53
	Others	3	4.92	1	0.48	4	1.5
	Total	61	100	206	100	267	100
Cooking in the living house	Yes	19	31.15	27	13.11	46	17.23
	No	42	68.85	179	86.89	221	82.77
	Total	61	100	206	100	267	100
Cattle living in living house	Yes	20	32.79	24	11.65	44	16.48
	No	41	67.21	182	88.35	223	83.52
	Total	61	100	206	100	267	100

Table 7: Percentage distribution of housing conditions of the student's parent by trachoma morbidity among Yello elementary school students in Yello Lala kebele, Loma woreda, Ethiopia 2015

Discussion

The study showed that trachoma affected a large segment of the children population in Yello elementary school students by 22.85%; this is nearest to study conducted in Baso Liben in East Gojjam 24.1 % [12]. But this value is higher than the study conducted in Dangla town of Amhara Region which was (12%) [13]. But lower than the study conducted in Ethiopia and Niger on 2006, with prevalence of 40.1% and 43% respectively [14,15]. This variation may be due to residence of the population and seasonal variation of the disease, meaning that there are variation in environmental cleanliness status and differences in availability of a standard latrine and garbage disposal facility among

each study site of resident populations as well as differences related to the time or season when those studies conducted. For instance, in autumn there are large amount of flies in Ethiopia (the highest flies reproduction season) [3].

This study showed that there is statistically significant association between prevalence of Trachoma and age groups at (P<0.05). This is similar to the study done in Brazil, Dangla Amhara Region and Tigray Region in Ethiopia [16,14,17]. The prevalence of the disease decreases as the age increase (Table 4). This is because as age increases awareness to keep personal hygiene increases which decreases trachoma morbidity.

The prevalence of trachoma is more in female 40 (65.575) than in males 21(34.43%). In other words, male to female ratio is 1:1.91. But this value has statistically insignificant association with trachoma morbidity (P>0.05). Similar studies done in Ethiopia by MOH revealed that the prevalence of trachoma was higher among women than men 1:2.56 [14]. In contrast, the study done in Baso Liben District of East Gojjam of Ethiopia showed that trachoma among girls (24.7%) and boys (23.5%) which were almost similar [12]. The reason might be due to the close relation of females with sibling with infected children.

This study also revealed that trachoma prevalence has statistically significant association with face washing habit, eye problem in the family and site of waste disposal (P<0.05). From face washing habit, among those washing once per day, from 24(8.99%), 14(58.33%) had signs of trachoma, the same study was conducted in different areas including Niger, Southern Sudan, Dangla and Baso Liben [15,18,14,12]. But study conducted in Tigray showed that , having no latrine was not a risk to develop trachoma (31); the reason might be due to the study method which encompassed environmental health workers for onsite observation to determine the presence of a standard latrine and garbage disposal facility.

Among population of 46 who cook in the main room, 19 (31.15%) were positive for trachoma; and from 44 population who live with cattle in the same room, (32.79%) were positive for trachoma. This is also similar to previous studies done in Niger, Southern Sudan and Tigray Region [15,17,18]. It might be due to the smoke of biomass energy produced while cooking and fumigating their room to alter the smell of animals waste and dung; resulting in increases of ocular discharge and enhance trachoma transmission.

Conclusion

The prevalence of active trachoma was high in the study area which indicates that trachoma is still a major public health concern among school age children in Yello. This study also showed that there is

significant association between trachoma morbidity and age, face washing habit, practice of towel usage, eye problem in the family, and site of waste disposal.

Competing interests

The authors declare that they have no competing interests

Authors' contributions

Both WA, AT and BF participated in the design and analysis of the study. WA searched the databases, and wrote the first and second draft of the article. All authors reviewed proposal development activities and each drafts of the result article and finally revised the manuscript and approved the final version.

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