Prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Northern Ethiopia

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Research article

Keywords: Active Trachoma, Factors, Environmental Components, Villages, Water Supply.

Posted Date: November 18th, 2019

DOI: https://doi.org/10.21203/rs.2.14562/v2

Version of Record: A version of this preprint was published on August 26th, 2020. See the published version at https://doi.org/10.1186/s12886-020-01585-9.

Abstract

Background Trachoma is the neglected eye problem and the primary cause of preventable corneal blindness. In endemic areas, an initial infection can occur in early childhood, and when there is recurrence, it progresses to scarring and blindness. In the past certain decades, trachoma eliminated from developed countries through enhancements of hygiene and sanitation under immense commitments of the governments but still a problem of developing countries. Studies and reports also indicated that the Amhara region had the highest prevalence of trachoma of the other regions in Ethiopia. Thus, the aim of this study was to asse{Birlie, 2016 #48}ss prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Amhara region, north Wollo zone, northern Ethiopia. Methods: Although the sample size was 583, a total of 596 children were screened for signs of active trachoma because of the sampling procedure nature, cluster sampling technique. Wadla district was had 150 rural villages, which were similar in topography and socio-demographic status. Of these villages, 30 were selected randomly as sites of data collection. An interview on the socio-demographic status with heads of households was held by health informatics professionals. The interview questioners were prepared through reviewing the literature and pretested in Meket Woreda. Eye examination was performed by integrated Eye care workers who were trained for one month for the purpose of trachoma screening. They were also involved in two national trachoma surveys as trachoma sign graders for Carter center-Ethiopia. Results - The prevalence of active trachoma among rural pre-school children in Wadla district was 130 (21.8%). On logistic regression, poor economic status (AOR (95% CI), (3.8 (1.3-11.4), being in 37- 48 months old (AOR (95% CI), (4.2 (1.5-12.0), lived in thatched house roof (AOR (95%CI), (4.4 (1.4-13.6), presence of fly in nearby home (AOR (95% CI), 4.6 (2.1-9.9), once weekly face washing frequency (AOR (95% CI), 8.6 (2.5-29.3), unwashed child’s face for longer than a week (AOR (95% CI), 10.6 (2.9-37.7), not using soap while washing children’s hand (AOR (95% CI), 4.5 (1.8-11.3), and absence of latrine (AOR (95% CI), 5.1 (2.0-12.9) were had association with active trachoma

Introduction

Trachoma is the neglected eye problem and a primary cause of preventable corneal blindness [1, 2]. It is categorized as clinically active trachoma (AT) and cicatricial trachoma [2-4]. In endemic areas an initial infection occurs in early childhood, and when there is recurrence, it progresses to scarring and blindness [5, 6].

Trachoma is usually a disease of poverty, and poor hygiene [7-9], that primarily infect children [5], and then adult women because of their proximity. In addition, preschool children are the main pool of trachoma infection [10]. Although, trachoma infects entire families and communities [11], it is more prevalent on children. In hyperendemic areas, active trachoma was the most common problem of preschool children with a prevalence rate of 60-90%, particularly in areas with poor water supply [10].

Trachoma transmitted through direct eye to eye spread, hand to hand contacts, or indirect spread through sharing of towels, fomites, pillows, eye seeking flies, coughing, and sneezing [12].

Globally, 60 to 80 million people were had been active trachoma and 2.3 million people were had been disability-adjusted life years [13]. More than 200 million people lived in trachoma endemic areas worldwide, 12.4 million children were suffering from active trachoma. Of the landmasses, Africa is the most affected continent with 27.8 million (68.5%) trachoma infected children [14].

Almost 50% of the worldwide burden of active trachoma was highly distributed in three African countries including Ethiopia, Malawi, and Nigeria [15]. Whereas more than 80% of the burden of active trachoma concentrated in 14 countries including Ethiopia, Mozambique, Egypt, Pakistan, Nigeria, and 9 other countries [16]. The global loss of productivity related to impaired vision and blindness from trachoma was thought to be as high as $US 5.3 billion annually [17].

WHO's 2002 global estimation indicated that there were 37 million blind people, and 124 million people with low vision. The burden of blindness in the sub-Saharan Africa region was some of the worst in the world. Fortunately, seventy-five percent of all blindness in developing countries could be prevented or cured [18].

The prevalence of blindness and low vision in Ethiopia was also among the highest in sub-Saharan Africa [18]. This degree of blindness was because of trachoma, as it is the leading cause of blindness worldwide, and especially in many developing countries [19]. Back in history and currently, Ethiopia is one of the most trachoma-affected countries in the world [18, 20].

A study in Nigeria [21] revealed the presence of flies on the face of children and absence of latrine as risk factors of active trachoma. A survey in 4 African countries showed that the prevalence of trachomatous follicular was highest among children aged 2–5 years in Ethiopia and Niger [22].

Studies in Ethiopia reported female sex, having an unclean face, not using soap, poor face washing habits, and absence of latrine as risk factors of active trachoma [18,23]. A study in Gonder province revealed that being in 1 to 5 years old had an association with active trachoma [24]. According to the World Health Organization's SAFE (Surgery, Antibiotic, Facial cleanness and Environmental change) strategy recommendation [25]; Ethiopia launched the VISION 2020 initiative in 2002 [26].

In the past certain decades, trachoma was eliminated from developed countries through enhancements of hygiene and sanitation under immense commitments of those governments but still a problem of developing countries. While trachoma was endemic in developed countries, governments were constructed health facility called trachoma hospital or trachoma clinic mainly for the treatment and care center for trachoma clients [27].

The inflammatory type of trachoma can be treated with antibiotics and the cicatricial trachoma treated with a simple surgery [11]. Irrespective of intensive SAFE implementation in Ethiopia, the prevalence in the Amhara region, Waghimra zone was 52.4% [26, 28] and a similar study from Dembia district, northwest Ethiopia reported a prevalence of active trachoma as 18% in 2017 [29]. Thus, active trachoma was a public health problem in most parts of Ethiopia [23, 30] with the highest prevalence being in the Amhara

region [26, 28,31-33] and needs frequent assessment to fill the gap and evaluate the effectiveness of the SAFE strategy. Because, the success of both of the preventive and curative elements of SAFE strategy required inclusiveness and accessibility to all of the community and household members including children, women, and men of all ages, people with disabilities, people living with chronic illness and others who are socially marginalized [34].

Furthermore, the prevalence and risk factors of active trachoma vary from setting to setting, and studying the prevalence and risk factors in this rural community would help to recognize the burden of the infection and its association with socio-demographic, economic, environmental and other determinant variables. The study was also conducted after 5 successive years of mass drug administration in the study area and could be considered as an evaluation of program effectiveness after the intervention.

Methods

Study design, period and setting

A community based cross-sectional study design was used from March 11/2017 to April 26/2107 in Wadla district. Wadla district is one of the administrative centers in the North Wollo zone, Amhara region. The capital city of the district is Kone. The town far away 725 km from the capital city of Ethiopia, Addis Ababa, and 75 km from Lalibela. The population of Wadla district was 128,170 with 64,574 males and 63, 596 females. There were 28,414 households in this district and resulting in having an average of 4.51 persons per house ratio [35]. The district had 1 general hospital, 7 health centers, and 20 health posts.

Population

The source population was children aged 1-5 years and their mothers in 150 rural villages of Wadla district. Whereas the study populations were children aged 1-5 years old and their mothers in 30 selected clusters or villages of Wadla district. The study units were rural households that had preschool children.

Sample size determination

The sample size estimated using a single population proportion formula. The assumptions used were a proportion of previous study 35.7% [21] from a study done in Nigeria, 95% CI, 5% margin of error, 1.5 design effect, and 10% non- response rate. It was calculated as

$$n = \frac{(Z_{@/2})^2 p (1- q)}{d^2}$$

$$n = \frac{(1.96)^2 (0.357X\ 0.643)}{(0.05)^2},$$

$$n = \frac{3.8416x.229551}{} = 352.7 \approx 353$$

(0.0025)

After multiplying by the design effect of 1.5, it gave (353 X 1.5) +353 = 529.5+52.95=882.45=583 children

Sampling technique and procedure

A multistage cluster sampling technique was applied to select study subjects. Wadla district had 20 Kebeles with a total of 247 villages. Twelve of the kebeles were rural, whereas 8 of the kebeles were urban. Of the total 247 villages, 150 were rural villages. There were 967 households in the selected 30 villages, but only 499 households were had preschool children. Thus, only those 499 households were visited and all the children between 1 and 5 years of age in the house were included for the study. A cluster sampling method was used to select study units. While selecting study participants two-stage sampling techniques were used. The first stage was to select 30 of 150 rural clusters or villages as study population. The second phase was to screen all the sample, 583 children within those 30 villages or cluster. Fortunately, the number of children included in the screening were 596, whose age was between 1 and 5 years from 499 households as per the assumption of cluster sampling. The guide used for diagnosis and reporting of eye examination results was the simplified trachoma grading scheme, which was developed by WHO for fieldwork [14] (Figure 1).

The heads of the households were interviewed for sociodemographic and economic information, housing and environmental conditions. Children were examined for the signs of trachoma from the 12 selected rural kebeles, and then 30 villages accordingly.

Operational/term definitions

Clean face: A child free of either of or both of eye discharge, fly on the face of the child and nasal discharge during data collection time only

Preschool: Children greater than and equal to 1 year and less than and equal to five years

Village: An assortment of homes that contain at least 30 households together and organized as one peasant association

Active trachoma: Preschool children who develop at least one of the two active stages of trachoma (TF or TI) [2, 6, 7].

Trachomatous inflammation follicular (TF): the presence of 5 or more follicles having at least 0.5mm or greater diameter in the central upper tarsal conjunctiva [2, 6, 7].

Trachomatous Inflammation intense (TI): the presence of pronounced inflammatory thickening of the upper tarsal conjunctiva that obscures more than half of the normal deep tarsal vessels [2, 6, 7].

Trachomatous scarring (TS): the presence of easily visible scarring in the upper tarsal conjunctiva [2, 6, 7].

Trachomatous trichiasis (TT): the presence of at least one eyelash rubs on the eyeball, or evidence of eyelash removal within two weeks before data collection periods [2, 6, 7].

Corneal Opacity (CO): the presence of easily visible corneal opacity over the pupil (2, 6, and 7).

Exclusion and Inclusion Criteria

All rural preschool children who lives in the district for at least 6 months and available during the data collection period were included. Seriously ill children or mothers who was not cooperative because of their illness for the data that the researchers required were excluded.

Data collection tools and procedures

Face to face interviews, observation using a checklist, and clinical eye examination were used to collect the data. The interview part on sociodemographic status, environmental, and housing conditions were collected by experienced diploma health informatics professionals using structured interview questioners, which were prepared through reviewing pieces of literature [33, 36]. All the socio-demographic status, housing, and environmental condition, observation checklist, and eye examination tools were pretested, and validated before data collection in Kosomender, Meket district. This is one of the boundaries to the south of Wadla district. A household wealth index was computed using the composite indicator for rural residents using assets: livestock ownership, size of agricultural land and quantity of crop production.

Eye examination was performed by two integrated eye care workers (IECWs), ophthalmic nurses, who were trained for one month for the purpose of trachoma screening by Carter center-Ethiopia. The training was delivered using both pictures and live patients. Those signs of trachoma screeners were involved in two national trachoma surveys as trachoma graders. In addition, they took refreshment training for 5 days together with demographic, housing, and environmental data collectors. The training emphasized on the objectives and procedures of the data collection and mode of communication between graders and interviewers. Specifically, the graders were provided with an additional 58 live patients and 100 pictures of different trachoma signs independently. The live patient diagnosis and picture reading were assured by the trainers' weather they diagnosed correctly or not. Both of the graders were not missed any of the live patients and pictures actual signs. In performing the actual screening, they initially observe the eyelashes and cornea of children to appreciate two of the cicatricial types of trachoma then eversion of the upper lid and inspection of the upper tarsal conjunctiva to identify the active stages using a magnifying binocular lenses (×2.5) and penlight torches as per WHO simplified grading scheme to identify the clinical signs of trachoma: trachomatous inflammation-intense (TI), trachomatous inflammation-follicular (TF), trachomatous conjunctival scar (TS), trachomatous trichiasis (TT), and corneal opacity (CO) [4].

Data analysis and presentation

The data were checked for completeness, coded and entered into Epidemiological Information (Epi -info) version 7 and then transferred to statistical package for social science version 23 for analysis. The data were also checked for normality using Hosmer-Lemeshow-goodness-of-fit. Both bivariable and multivariable analysis was carried out and variables in bivariable analysis with p-value of 0.25 included for multivariable analysis. Potential co-linearity was also considered and tested. Variables with a P-value of less than 0.05 in multivariable analysis were considered as statistically significant. A principal component analysis was performed to categorize the households' wealth index into lowest or poor, middle, and highest or rich. The result of the analysis expressed in descriptive and inferential statistics. The finding was also presented in the forms of tables, and figures. The main output of the study was presented in considering both types of trachoma (Figure 2).

Data Quality Assurance

The questionnaire was prepared in English and translated to Amharic, and then translated back to English to check its consistency by individuals, who are fluent in both English and Amharic languages. Both of the graders and one of the researchers participated previously in a community-based trachoma survey. The interviewers have also had experience in community-based data collection. The inter-rater variability of eye examination was trying to solve by recruiting certified trachoma graders who participated in two national trachoma surveys. In addition, a pretest on 10% (58) of the questionnaires were done in a village called Kosomender, Meket district. A refreshment training was also delivered for both graders, and interviewers by the principal investigators, and one ophthalmologist for five days. On the third day of the training session, all the teams were gone to the field to check the questioner and did eye examination on the rural preschool children. The result of those 58 children was discussed in the fourth and fifth days of the training.

Results

Socio-demographic status of households

In this study, a total of 596 preschool children from 499 households were screened for signs of active trachoma and making a response rate of 100%. Nearly three fourth, 383(76.8%) of households were had male heads and 116 (23.2%) of the households were had female heads. In each household, the minimum number of family size were 2 and the maximum number were 10 with a median number of 5 families. All the 499 of the households were Amhara in ethnicity and were a follower of Ethiopian orthodox Christianity, and 325 (65.1%) of fathers of children and 380 (76.2%) of mothers were unable to read and write. Regarding occupation 466 (93.4%) of fathers were farmers and 16 (3.2%) of fathers were government employees. In each household, the minimum number of children aged under five years were 1 and the maximum number were 3 with a median number of 1 child, whereas the minimum number of children under the age of ten years were 1 and the maximum number were 4 with a median number of 2 children. The minimum and maximum numbers of rooms within the houses were 1 and 4 respectively

with a median number of 1 room. Regarding the household's economic status, 279 (55.9%) of the households were had medium economic status, however 76 (15.2%) of households were under the highest economic status, and 144(28.9%) were the under poor or lowest economic status **(Table 1).**

Environmental characteristics of households

Households that used less than 20 liters of water per day were accounted for 180 (36.1%) and 459 (92%) of the households got water after walking 1/2hr. This 1/2hr walking was the minimum time among all households but the maximum hour to fetch water was 4hr. The minimum distance of households from local town was 0.4 km and the maximum distance was 9 km with a median distance of 2km. In addition, the minimum distance of households from the nearest health center was 0.5km and the maximum distance was 13 km with the median distance of 3km. Nearly, 147 (29.5%) of the houses were had clean grass house roof, 133 (26.7%) of houses had thatched corrugated iron roof, 139 (27.9%) of house had thatched grass roof, and 80 (16%) of houses were had clean corrugated iron roof (Table 2).

Socio-demographic status of children

Among the total screened children for active trachoma 301 (50.5%) were males and 295 (49.5%) were females. On observation 424 (71.1%) of the children were having an unclean face. The minimum ages of children were 12 months and the maximum ages were 59 months with a median age of 36 months. The minimum MUAC of those under-five children was 10.90 cm and the maximum were 17.50 cm with a median MUAC of 13.7cm. The caregivers of children reported that the minimum age of neighbors with a sign of trachoma was 12 months (1 year), and the maximum was 765 months (63.75 years) with a median age of 65 months. The age distribution of rural preschool children in Wadla district showed that 208 (34.9%) were 1 year old (12-24 months), 102 (17.1%) were 2 years old (24-36 months), 157 (26.3%) were 4 years old (48-59 months), and 129 (21.60%) were 3 years old (36-48 months) **(Table 3).**

Prevalence of Trachoma

The prevalence of active trachoma in Wadla district was 130 (21.8%), [(95%, CI), (18%, 25%)]. In classification, 106 (81.5%) was TF, 13 (10%) was TI, and both TF and TI were 11 (8.5%). There was no trachomatous scarring (TS), trachomatous trichiasis (TT), and corneal opacity (CO). The prevalence of trachoma by sex were reported as 56.2% of females and 43.8% males had active trachoma. The prevalence of active trachoma by age of children was described to be 2.3% among 12 – 24 months old children, on 25-36 months old children were 10.8%, and among 48-59-months old children, the prevalence was 29.2%.

On observing the face of preschool children 280 (47%) were had clean face, 89 (14.9%) were had ocular discharge, 75 (12.6%) were had nasal discharge, 34 (5.7%) were had both ocular and nasal discharge and 55 (9.2%) of the children were had all nasal, ocular discharge and fly on the face of children. Whereas 63 (5.7%) of children were had both ocular and nasal discharge.

Risk Factors

On bivariable analysis poor economic status (COR (95% CI), (4.64 (2.35-9.14), being in the age group of 24-36 months old (COR (95% CI), (0.49 (0.25- 0.97), unable to read and write educational status of fathers (COR (95% CI), (1.69 (0.84-3.40), unable to read and write educational status of mothers (COR (95% CI), (2.96 (1.32-6.64), houses with thatched grass roof (COR (95% CI), (3.5 (1.9-6.7), fly in the house or in nearby, (COR (95% CI), 3.6 (2.3-5.5), and MUAC of children < 13.9cm (COR (95% CI), (1.69 (1.14-2.53) were had association with active trachoma. But on multivariable analysis only poor economic status (AOR (95% CI), (3.80 (1.27-11.42), being in the age group of 37- 48 months old (AOR (95% CI), (4.21 (1.47-12.03), lived in houses with thatched grass house roof (AOR (95% CI), (4.40 (1.42-13.59), and presence of fly-in or in nearby to home ((AOR (95% CI), (4.6 (2.1-9.9) were increased the odds of active trachoma **(Table 4).**

Discussion

The objective of this study was to assess the current status of active trachoma and to identify risk factors among children aged 1 –5 years in the rural communities of Wadla district. The prevalence of Active Trachoma in rural Wadla district among rural preschool children was 21.8%, [(95%, CI), (18%, 25%)]. This prevalence puts the district on 3 years of mass drug administration as the World Health Organization's recommendation [25]. The recommendation is stated as if the prevalence of TF≥10% to <30%, mass drug administration for the population at the district level for at least 3 years is required [25]. This result may provide an indirect clue about the presence of a gap on the effectiveness of SAFE strategy regardless of 7 years of mass administration in Wadla district [34]. Because the maximum years of mass drug administration to decrease the prevalence of active trachoma to below 10% in an endemic area is 5 years [25]. The result was agreed with some studies [18, 23, 32, 36] that reported the prevalence of Active Trachoma was above 20%. This current evidence together with this literature assures that trachoma is still a public health problem. In more comparison, the finding also agreed with previous reports and researches [23, 37] done in Africa and different parts of Ethiopia, such as the 6th meeting report of WHO, that reported the prevalence of active trachoma in Algeria was 26%, in Burkina Faso was 26.9% [37] and a study in different regions of Ethiopia reported the prevalence as 22.6% in Somali region, in Tigray region 26.5% and 19.1% in Gambela region [23]. This study was almost exactly similar to a study conducted on a similar population at a similar setting in almost nearly in a similar year, which was 18.2% [29]. The similarity is expected as both of the studies were conducted on pre-school children from one region, the Amhara region. The finding of this study was lower than that of the studies done in southern Sudan 64.5% [38], in Egypt 49% [39], and in Nigeria 35.7% [21]. This variation might be the result of different study periods and differences in health care service. Because this study conducted after 8 years relative to those studies used to referee. In addition, intensive SAFE strategy implementation in all endemic countries have reached a peak in the past seven years, which contributed to this low result report. Similarly, the finding is lower than many studies 59.2% [40], 32.4%, 42.4%, 56.9% [36], 62.6% [18], 40.1% [30] conducted before 2015. Therefore, the current reduction of active trachoma in the study area and in other endemic areas across the continent [24] Africa maybe mainly the result of SAFE strategy implementation and improved socio-demographic status. But, the finding of this study was higher than a

study conducted in 2016 in Gonder, Ethiopia (12.1%) [24]. The difference might be because of different study populations, the difference in the level of urbanization and difference in infrastructure. This study was done only in rural children aged 1 to 5 years but the comparative one is in urban children aged 1 – 9 years old [24]. The other possible reason may be that trachoma is highly prevalent in pre-school children than children aged 1-9 years old.

The prevalence of TI in this study area was 3.4% agreed with the study conducted in South Wollo zone 4.3% [41], and lower than the study in the South Gonder zone 7.0% [41]. This discrepancy might be the result of different study subjects and this discrepancy agreed with the statement that the progress of trachoma from one stage to another stage is gradual and increases as age increases [2].

The study showed washing face once weekly (AOR (95%CI), 8.686 (2.577-29.277) and unwashed face for longer than a week (AOR (95% CI), 10.592 (2.974-37.727) as well as presence of fly in near home (AOR (95% CI), 4.603 (2.138-9.911) had positive association with active trachoma, which is in line with a study conducted in southern Sudan, and Gonder, Ethiopia [42,43]. Absence of toilet (AOR (95% CI), 5.089 (2.011-12.876) also had a positive association with active trachoma, which is also similar to a study conducted in Nigeria, Egypt, north-west Ethiopia, and Gonder [41, 42, 44, 45]. The presence of human excreta near to home (AOR (95%CI), 5.089 (2.011-12.876) also increased the odds of active trachoma. This is supported by a study conducted in Dera district, Ethiopia [46]. This study also reported not using soap while washing face were increasing the odds of acquiring active trachoma (AOR (95%CI), 4.493 (1.788-11.290) and it is supported by the study conducted in Dessie city, Ethiopia, and Gonder, Ethiopia [42, 47].

All of these positively associated risk factors agreed with a literature that trachoma is mainly attributed to environmental factors, sanitation, and hygiene practices. The Bazaar vector, Musca Sorben is the proposed major risk factor of trachoma, which is multiplied in open field human excreta. Therefore, the absence of latrine increases the occasion of fly multiplication sites and densities of fly, which in-turn causes active trachoma[48]. The poor habit of hygiene and sanitation as well as failure to use soap also contribute to the presence of ocular and nasal discharge on children's faces, which opens the opportunities for flies to contact with the unclean face of those children. Thatched grass house roof (AOR (95% CI), 4.402 (1.425-13.597) had association with active trachoma, which is in line with a study done in central Ethiopia [49] and poor economic status (AOR (95% CI), 3.804 (1.267-11.424) were increase the odds of active trachoma, which is supported by the study done in Gonder, Ethiopia [42]. These association are also consistent with a literature that trachoma is a disease of poverty, overcrowding, and poor hygiene [8, 9, 24, 28, 33, 36, 40, 45, 46, 50].

Conclusions

The prevalence of active trachoma among rural preschool children was found to be high as per the WHO recommended thresholds to initiate trachoma control strategies (>10% prevalence), which indicates that active trachoma is still a major public health problem in the study area. But this study is studied on pre-school children only, who had the highest prevalence of trachoma than studies studied on children aged

1-9 years. Some environmental factors were also found to be associated with active trachoma than other variables and this may use as evidence for policymakers to emphasize on the environmental components of the SAFE strategy mainly on facial cleanness and environmental hygiene.

Limitation

The study has some important limitations that should be considered when inferring the results. The first limitation, the study did not take stool sample and unable to show the association of active trachoma with sanitation and hygiene as supported with intestinal parasitic infections. Second, the lack of researches done on children aged 1 to 5 years cause to discuss the finding with researches done on children aged 1 to 9 years. This might decrease the reliability of the discussion section as preschool children had high prevalence of active trachoma than children aged 1 to 9 years old. Third, most of the studied variables were more subjective by nature and may be susceptible to reporting bias regardless of rigorous methodology and quality assurance procedure as the data was collected based on self-reported information.

List Of Abbreviations

COR – Crude odds ratio, AOR- Adjusted odds ratio, CI – Confidence interval, AT-Active Trachoma, SAFE-Surgery, Antibiotics, Facial Cleanness, Environmental Changes, GET2020- Global elimination of Trachoma in 2020, WHO- World Health Organization, TT- trachomatous trichiasis, TF- trachomatous follicular, TI-trachomatous intense, TT- trachomatous trichiasis, CO- corneal opacity, MUAC-Mid upper arm circumference.

Declarations

Ethical Consideration

An ethical approval letter was obtained from Mekelle University, College of health science. The study protocol was evaluated and approved by the Health Research Ethics Review Committee [HRERC 0917/2017] of the College of Health Sciences, Mekelle University.

Written permission was also obtained from Woldia zonal health department and send to Wadla district health office. The Woreda health office have also approved the permission written by North Wollo zone health department. Finally, a written consent was taken from children’s mothers for interview and eye screening after explaining the purpose of the study. Confidentiality was also maintained by omitting the name and personal identification of respondents (both children and caregivers) because it was not compelled to the study.

Consent for Publication

Participants were informed and gave their written consent to publish the findings in reputable international journal.

Acknowledgment

Our deepest gratitude is forwarded to the department of nursing, college of health science, Mekelle University for the provision of main fund and Wadla district health office for providing additional funds. We are also grateful to Mr. Semagn Gubala, Mr. Mulugeta Wodaje, Mr. Matiyas Munye, Mr. Melak Menberu, and Mr. Eskezaw Abebe for their unrestricted support for the completion of this work by collecting data, revising or commenting the draft. Lastly, we are grateful to the community of the study area and all the respondents whose participation made possible the collection of the data set used in this work.

Funding

This study was supported by Mekelle University, College of Health Sciences, and Wadla district health office, northern Ethiopia.

Availability of data and materials

The raw material supporting the conclusions of this research will be available to researchers needing the data to use for non-commercial purposes.

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Author Contributions

Conceived the title and designed the study: MWK, and AMA. Field study: MWK, KDT. WMT, MAG, AMA. Analyzed the data: MWK, AMA, KDT, MAG, WMT. Critically revising the work: MWK, AMA, KDT, MAG. Writing the final paper: MWK, WMT, AMA, and KDT. Finally, all authors have read and approved the final version of this manuscript"

Competing interests

The authors declare that they have no conflicting interests

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Tables

Table 1: The socio-demographic status of households in assessing prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Amhara region, Northern Ethiopia, 2017

Variables	Frequency (n=499)	Percent (%)
Sex of the head of the Household		
Male	383	76.8
Female	116	23.2
Marital status of the head of the household		
Married	492	98.6
Divorce	7	1.4
Wealth index		
Poor	144	28.9
Medium	279	55.9
Rich	76	15.2
Occupation of the head of the house hold		
Farmer	466	93.4
Merchant	17	3.4
Government employee	16	3.2
Educational status of the head of the household		
Unable to read and write	325	65.1
Able to read and write	109	21.8
Up to grade 8	35	7
Grade 9-12	19	3.8
Diploma and above	11	2.2
Educational status of mothers		
Unable to read and write	380	76.2
Able to read and write	55	11
Up to grade 8	23	4.6
Grade 9-12	35	7
Diploma	6	1.2
Number of rooms in the house (observation)		
One	424	85
Two and More	75	15
Family Size		
Less than 6	286	57.3
Greater than and equal to 6	213	42.7
Total number of children less than five years in the house		
One	424	85
Two	69	13.8
Three	6	1.2
Number of children less than ten years in the house		
One	132	26.5
Two	240	48.1
Three	102	20.4
Four	25	5
Adult Face washing habit (self report)		
At least one times per a day	417	83.6
Less than 7 times per week	82	16.4

Table 2: The environmental situations of households in assessing prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Amhara region, northern Ethiopia, 2017

Variables	Frequency (n= 499)	Percent (%)
Presence of fly in or around house (observation)		
Present	242	48.5
Absent	257	51.5
Source of water (self-report)		
River	30	6.0
Unprotected well	12	2.4
Protected well	56	11.2
Pipe	401	80.4
Amount of water in litter (self -report)		
Less than 20	180	36.1
20-40	162	32.5
40-60	92	18.4
60-80	49	9.8
Greater than 80	16	3.2
Total time taken to reach to water source (self-report)		
Less than and equal to 1/2 hr.	459	92
Greater than 1/2 hr.	40	8
Place of cooking (observation)		
In the same room of living house	157	31.7
In the same house but in a kitchen	166	33.3
A kitchen constructed against outside wall of the house	3	.6
Isolated kitchen	173	34.7
Presence of window in a kitchen (observation)		
Yes	248	49.7
No	251	50.3
Household waste removal (self-report)		
Burn it	312	62.5
Bury it	90	18
Dispose in the farm	93	18.8
Dispose in another place	4	.8
Presence of latrine (observation)		
Present	371	74.3
Absent	128	25.7
Presence of feces at open field in nearby house (observation)		
Present	243	48.7
Absent	256	51.3
Presence of cattle in the household (observation)		
Present	439	87.9
Absent	60	12.1
Cattle sheltering (n=439) (observation)		
In the same room where family lives	128	29.1
In the same living house but in a separate room	203	46.2
Attached shelter against outside of the house	6	1.6
Isolated shelter far from the house	102	23.1

Table 3: The socio-demographic status of children in assessing prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Amhara region, northern Ethiopia, 2017

Variables	Frequency (n=596)	Percent
Sex of children		
Male	301	50.5
Female	295	49.5
Age of children in months (kebele registration book)		
12 – 24	208	34.9
25 – 36	102	17.10
37 – 48	129	21.6
49 – 59	157	26.3
Current breast-feeding status of children		
Yes	239	40.1
No	357	59.9
Face washing frequency of children (self-report)		
2 or more times per a day	108	18.1
Once daily	79	13.3
2 to 6 times per week	149	25
Once weekly	167	28
Stays unwashed for longer than a week.	93	15.6
Habit of child bathing for at least one times per a week (self-report)		
Yes	445	74.7
No	151	25.3
Use of soap for face washing (self-report)		
Yes	264	44.3
No	332	55.7
Use of soap for hand washing (self-report)		
Yes	254	42.6
No	342	57.4
Face of children on observation (observation)		
Clean face	**280**	47
Ocular discharge	89	14.9
Nasal discharge	**75**	12.6
Flies on the face of child		10.6
Ocular and nasal discharge	34	5.7
Ocular & nasal discharge & flies on the face	**55**	9.2
Presence of another eye problem (self-report)		
Yes	146	24.5
No	450	75.5
Type of eye problem (n=146)		
Discharge	96	65.6
Itching	8	5.3
Excessive tear	25	17.1
Redness of eye	18	12.2
Took drug during mass drug administration in the last year (self-report)		
Yes	515	86.4
No	81	13.6

Table 3: The bivariable and multivariable logistic regression analysis in assessing prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Amhara region, northern Ethiopia, 2017

	Trachoma (n=596)		OR (95% CI)	
Variables	Presence (%)	Absence (%)	COR	AOR
Type of House roof (observation)				
Clean iron	15 (11.5)	82 (17.6)	1.00	1.00
Thatch iron	24 (18.5)	141 (30.3)	0.9(0.5-1.9)	0.9 (0.3-2.8)
Clean grass	27 (20.8)	144 (30.9)	1.0(0.5-2.0)	0.7 (0.2-2.2)
Thatch grass	64 (49.2)	99 (21.2)	**3.5 (1.9-6.7) ***	**4.4 (1.4-13.6) ***
Fly in the house or in nearby (observation)				
Yes	96(73.8)	206 (44.2)	**3.6 (2.3-5.5)**	**4.6 (2.1-9.9) ***
No	34 (26.2)	260 (55.8)	1.00	1.00
Face washing frequency (self-report)				
Two and more times	9 (6.9)	99 (21.2)	1.00	1.00
Once daily	2 (1.5)	77 (16.5)	0.3 (0.1-1.4)	0.2 (0.03-1.3)
2-6 times per week	15 (11.5)	134 (28.8)	1.2 (0.5-2.9)	1.366 (.365-5.114)
Once weekly	63 (48.5)	104 (22.3)	**6.7 (3.1-14.1) ***	**8.7 (2.6-29.3) ***
Unwashed for a week.	41(31.5)	52 (11.2)	**8.7 (3.9-19.2) ***	**10.6 (2.9-37.7) ***
Soap for face washing (self-report)				
Used	26 (20)	238 (51.1)	1.00	1.00
Not used	104 (80)	228 (48.9)	**4.2 (2.6-6.7) ***	**4.5 (1.8-11.3) ***
Soap for hand washing (self-report)				
Used	35 (26.9)	219 (47.0)	1.00	1.00
Not used	95(73.1)	247 (53.0)	**2.4 (1.6-3.7) ***	1.6 (0.8-3.6)
Household Latrine (observation)				
Present		364 (78.1)	1.00	1.00
Absent		102 (21.9)	**2.0 (1.3-3.0) ***	**5.0 (2.0-12.9) ***
Household waste around the house (observation)				
Exist	80(61.5)	214 (45.9)	**1.9 (1.3-2.8) ***	**3.4 (1.6-7.6) ***
Not exist	50 (38.5)	252 (54.1)	1.00	1.00
Mothers educational status				
Unable to read and write	111 (85.4)	348 (74.7)	**2.9 (1.3-6.6) ***	0.8 (0.2-3.2)
Able to read and write	12 (9.2)	53 (11.4)	2.1 (0.8-5.7)	0.3 (0.1-1.6)
Attend formal education	7 (5.4)	65 (13.9)	1.00	1.00
Wealth index				
Poor	73 (56.2%)	101 (21.7)	4.6 (2.3-9.1) *	4.2 (1.5-12.0)
Medium	45 (34.6%)	288 (61.8)	1.003 (.506-1.988)	0.5(0.2-1.4)
Rich	12 (9.2%)	77(16.5)	1.000	1.00
MUAC of children				
Less than 13.9	81(62.3)	230 (49.4)	1.7 (1.1-2.52) *	1.3 (0.6-2.6)

Greater than 14	49(37.7)	236 (50.6)	1.00	1.00
Age of children				
12-24	42	166 (35.6)	0.8 (0.5-1.3)	0.7 (0.3-1.8)
25-36	(32.3)	88 (18.9)	0.5 (0.3-0.9) **	0.7(0.2- 2.1)
37-48	14 (10.8)	93 (20)	1.2 (0.7-2.1)	2.7(.1.0-7.2)
49-59	36 (27.7)	119 (25.5)	1,00	1.00
Fathers education	38 (29.2)			
Unable to read & write		299 (64.2)	2.3 (1.1-4.7) **	1.4 (0.3-6.2)
Able to read & write	93 (71.5)	102 (21.9)	1.9(0.9-4.5)	2.1 (0.5-9.7)
Formal education	28 (21.5)	65 (13.9)	1.00	1.00
	9 (6.9)			

Note: “*” = P - value less than 0.001 and “**” = P - value less than 0.05

Figures

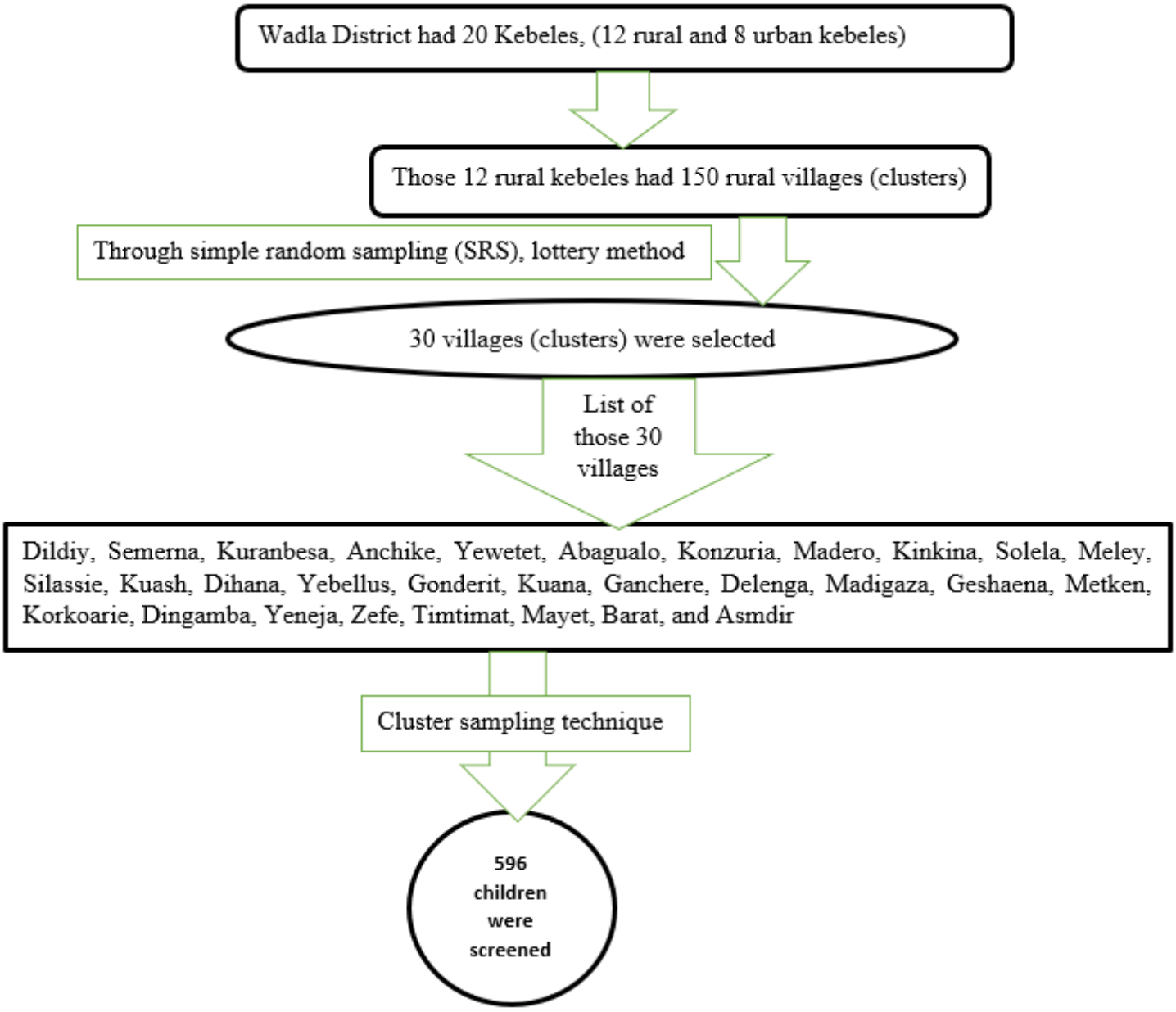

Figure 1

The schematic diagram of sampling procedure in assessing prevalence and risk factors of active trachoma among rural pre-school children in Wadla district, 2017 The sample size calculated was 583 using single population proportion formula, but as the sampling procedure was cluster sampling, the screening was included 596 pre-school children.

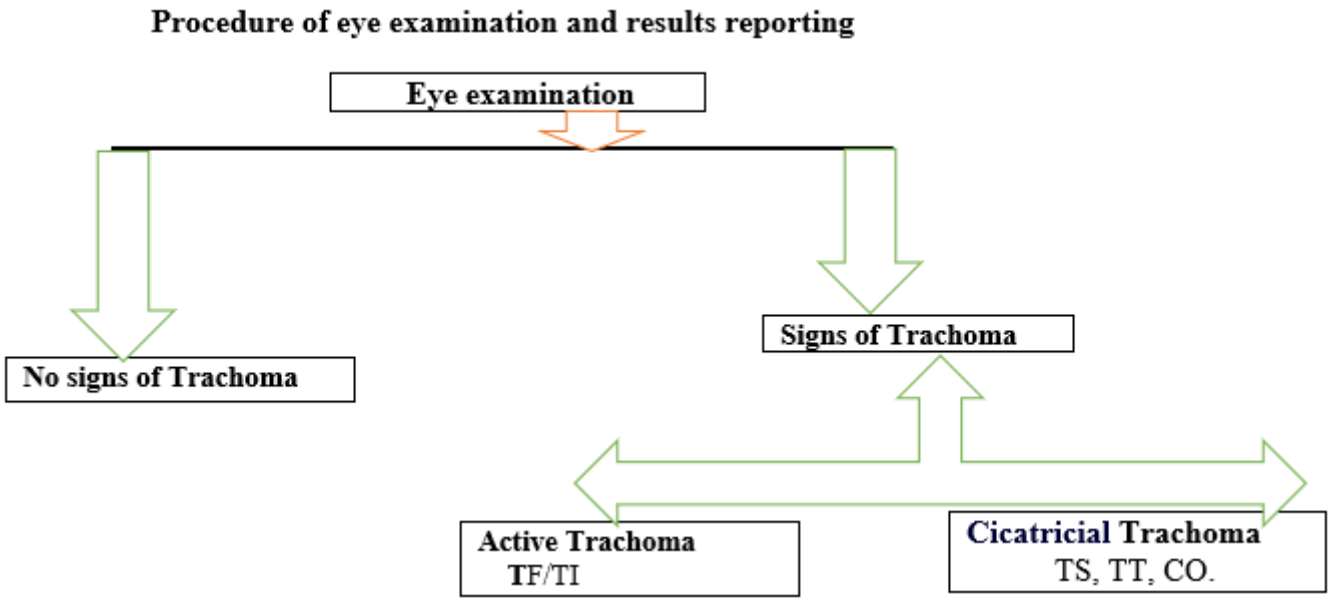

Figure 2

The schematic presentation of eye examination and result reporting procedure in assessing prevalence and risk factors of active trachoma among rural preschool children in Wadla district, Amhara region, northern Ethiopia, 2017.Key: TF- Trachomatous inflammation follicular, TI- Trachomatous Inflammation intense, TS- trachomatous scarring, TT- trachomatous trichiasis, and CO- corneal opacity

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- TableS1.docx
- TableS2.docx