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**Prevalence and associated factors for Trachoma among children aged 1–9
years in rural residents of Meta Robi district, Oromia Regional State, 2019:
community based cross sectional study**

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**PREVALENCE AND RISK FACTORS FOR TRACHOMA AMONG
CHILDREN AGED 1–9 YEARS IN RURAL RESIDENTS OF META ROBI
DISTRICT, OROMIA REGIONAL STATE, 2019: COMMUNITY BASED
CROSS SECTIONAL STUDY**

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Abstract

Background: Globally, 200 million people are still at risk of trachoma and children are the most affected. Ethiopia has the highest prevalence of trachoma and endemic in 604 rural districts with 73.2 million people are at risk of infection. It is common in small children than any other segment of the population especially in children aged 1–9 years. However, Meta Robi is one of the districts where the prevalence and risk factors of trachoma is not studied before and eye problem is common among rural children. Therefore, the aim of this study is to assess prevalence and risk factors for trachoma among children in rural residents of Meta Robi District, West Shoa Zone, Oromia Regional state, 2019.

Method: A community-based cross-sectional study was conducted in Meta Robi district from March 01 to April 15, 2019. A total of 380 participants were examined for trachoma based on the simplified World Health Organization trachoma grading system. A multistage sampling technique was used to select study participants. Data was collected by using a structured pretested questionnaire and clinical eye examination was conducted. Data was entered using EpiData 3.1 and analyzed by using SPSS version 21. Both descriptive and analytical statistical procedures were utilized. Multivariable logistic regression analysis was used in identifying independently associated factor and declared statistically significant at p value <0.05.

Result: The overall prevalence of trachoma among children aged 1–9 years in the district was 8.9 % (95% CI; 6.3-11.8), (Trachomatous Inflammation Follicular (4.7%) and Trachomatous Inflammation Intense (4.2%). Family monthly income \geq 650 ETB of respondents (AOR= 0.143; 95% CI; 0.034-0.602), children from respondents those who were farmers (AOR =8.169; 95% CI; 2.406-27.735), absence of latrine (AOR=4.255; 95% CI; 1.086-16.675), absence of discharges on eyes (AOR=0.325; 95% CI; 0.123-0.860), absence of fly breeding site (AOR=0.118; 95% CI; 0.043-0.328) and number of children aged 1-9 years old greater than two of the respondents (AOR= 4.029; 95% CI;1.082-15.007) were associated factors for trachoma.

Conclusion and recommendation: The prevalence of trachoma among rural children aged 1–9 years old in the district was greater than World Health Organization trachoma elimination cutoff point which warrants the trachoma prevention and controls strategy to be strengthened in the district. For the identified risk factors for trachoma, district health office and health extension worker should strength community lead total sanitation and hygiene.

Keywords: Trachoma, Risk factors, Meta Robi district, Ethiopia

Abbreviations/Acronyms

ANRS	Amhara National Regional State
AOR	Adjusted odds ratios
BSc	Bachelor of Science
CI	confidence intervals
CO	Corneal Opacity
ETB	Ethiopian birr
GAT	Global Atlas of Trachoma
HH	House hold
MDA	Mass drug administration
MOH	Ministry of health
MPH	Masters of Public Health
NGOs	Non-Governmental Organizations
SAFE	Surgery Antibiotic Facial Environment
SOP	Standard Operative Procedures
SNNPR	Southern Nation Nationality and People of Republic
SPSS	Statistical Package for Social Science
TF	Trachomatous Inflammation – Follicular
TI	Trachomatous Inflammation Intense
TS	Trachomatous Scar
TT	Trachomatous Trichiasis
US	United State
WHO	World Health Organization

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CHAPTER ONE: INTRODUCTION

1.1 Background

Trachoma is an eye disease caused by ocular infection with bacterium *Chlamydia trachomatis*, which can result in blindness after cycles of repeated infections(1). It is one of the oldest known infectious diseases to mankind and the leading infectious to cause blindness worldwide(2). Transmission occurs primarily through close contact of droplets containing *C. trachomatis* spread through touching infected eyes, contact with contaminated pillows, clothes and towels, and feces breeding flies, particularly among young children in rural communities with limited water supplies(3,4).

In an endemic community, the primary reservoir of *Chlamydia trachomatis* is in children, particularly those between 1-9 years, due to the transmittable nature of trachoma(5,6).

Trachoma occurs in areas with overcrowded housing where personal and community hygiene are difficult to maintain and where there is reduced access to or use of water, inadequate waste disposal and high numbers of flies (7,8).

Cases of trachoma will be diagnosed based on clinical signs and symptoms of disease during an ocular examination, usually using the WHO simplified grading system. Early diagnosis and treatment at first stages is essential to avoid the development and associated complications from trachoma. Sign and symptoms trachoma are presence of five or more follicles in the upper tarsal conjunctiva which is characterized by whitish, gray or yellow elevation paler than the surrounding conjunctiva. The other sign and symptom of trachoma is the redness, rough and thickened of the upper tarsal conjunctiva that obscures more than half of the deep conjunctivas vessels(9,10).

World Health Organization recommends a multi-faceted intervention SAFE (Surgery, Antibiotics, Facial cleanliness and Environmental improvement) strategy for eliminating blinding trachoma. Antibiotic treatment of active trachoma is particular importance where active disease Trachomatous Inflammation Follicular (TF) and Trachomatous Inflammation Intense (TI) is diagnosed. Facial cleanliness is a simple and effective method of preventing infection with trachoma and reducing the spread of disease. Environmental improvements are improving overcrowding, water and sanitation facilities(10).

1.2 Statement of the problem

Globally, 200 million people are still at risk of trachoma and children are the most affected. It remains the leading cause of blindness. About 1.9 million people are visually impaired, and 3.2 million people need surgery to avoid blindness because of trachoma(8,10). It remains prevalent in developing and marginalized communities, particularly in Africa, where crowded living conditions are common, health care are often limited and poor socio-economic status(12–15).

Despite changes brought socioeconomic development and disease control programmes, trachoma continues to be hyper endemic in many of the poorest rural areas of the world, especially in areas that have limited access to safe and adequate water supply and sanitation(13). Nearly 50% of the global burden of active trachoma is highly distributed in three countries: Malawi, Nigeria and Ethiopia (16).

In trachoma endemic communities, children are the most frequently infected with *C. trachomatis* due to their tendency to have close contact with others and not keep their faces free of secretions; however the blinding effects of repeated infection generally do not develop until adulthood(17).

Of the nine National Regional States in Ethiopia, the Amhara National Regional State (ANRS) is the most severely affected trachoma (62.6%) endemic area of Ethiopia(18). Similarly Oromia is the second affected by trachoma (41.3%) next to Amhara National Regional State because of poor environmental sanitation and hygiene conditions (19,20). Trachoma is the public health importance and relatively high prevalence was observed in the eastern and central part of Oromia including East Shewa, Borena, Bale, Arsi, East Harerge, West Harerge and West Shewa(20).

Global loss of productivity related to impaired vision and blindness from trachoma is thought to be as high as \$US 5.3 billion annually(16). Trachoma is predominantly found in resource poor and rural communities in low-income countries. By afflicting some of the most deprived people in the world, it leads to disability, dependency and further poverty(12). If not identified and treated earlier trachoma can contribute to poverty. Poor health from trachoma frequently results in loss of productivity through disability and diversion of resources. Previously healthy and

productive adults can be rendered dependent on others, unable to work or fully care for themselves due to pain, photophobia or visual impairment from trachoma(21).

Despite efforts by Non-Governmental Organizations (NGOs) and the MOH and other stakeholders in continued health promotion and sensitization interventions to curb trachoma, the prevalence rates are still high in some zones in the Oromia regional state. Additionally, in Oromia the proportion of people with easy access to improved water (34.0%) and basic sanitation (24%) is very low(22,23). More recent studies conducted in rural children in Dera Woreda, Northwest Ethiopia near to the Meta Robi District: showed the prevalence of active trachoma among children aged 1–9 years was 18.6% (24).

The distribution of trachoma is likely to arise from complex relationships between risk factors for trachoma at different scales. Different study conducted at different part of the country indicated that a number of risk factors for trachoma were identified like age, availability of latrines, type of water source, poor personal hygiene, educational status of parents/care givers and health care, rural living conditions , latrine use and access to water (12,25).

Other study identified that the risk factors for trachoma among children were illiterate household heads, presence of more flies on the face of children, less average daily water consumption, less awareness about trachoma, number of children under 10 years of age within household, route of waste disposal, cattle housing practice, time to collect water and frequency of face washing practice(2,26).

There are also the study that indicated Ocular discharge, nasal discharge, frequency of hand washing, monthly family income, occupation, sex of child as risk factors for the prevalence of trachoma(13,18,27).

The risk factors for trachoma vary between settings depending on individual, economic, and environmental factors. Since the prevalence and risk factors associated with trachoma varies from setting to setting, knowing the magnitude and risk factors associated with trachoma in this specific community would help to understand the disease magnitude and transmission.

Trachoma is very common in small children than any other segment of the population especially in children aged 1–9 years. Meta Robi is one of the Districts found in the Western Shoa Zone where in which no report has been documented so far on prevalence and associated factors of

trachoma among children aged of 1-9 years. In the district the latrine coverage low (37%) and accessible water (56.5%) is low compared to other district found in the Zone. This concern led to investigations toward finding of prevalence and risk factors for trachoma among children in the District.

Therefore this study is aimed to assess prevalence of trachoma and factors associated with it in rural children of Meta Robi district, West Shoa Zone, Oromia Regional state, Ethiopia.

1.3. Significance of the study

This study would provide basic information about prevalence of trachoma and the risk factors that are associated with trachoma for the district health office in order to take correct intervention. The result of these study would help the governmental and NGOs who are working on trachoma to design possible intervention strategies. Results from the study could thus help make the intervention more focused and effective and this study is crucial to evaluate the ongoing intervention. Furthermore, it would provide baseline information and used as a literature for future researchers on similar study for other researchers' who would conduct related studies.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of Trachoma

Trachoma is a disease of the eye, caused by infection with the *Chlamydia trachomatis* bacteria, particularly its serovars A, B, Ba and C. It is the world's leading infectious cause of preventable blindness. Based on reporting by the World Health Organization (WHO) in February 2018, trachoma remains endemic in 41 countries in which many people have visual impairment due to trachoma, worsening the quality of life in those who are already disadvantaged(17,28,29).

Many studies had been identified Trachoma prevalence and its risk factors at different study areas. Although they have identified prevalence and risk factors for trachoma, they have come up with some weakness. A population based survey conducted in Central and Southern Malawi have come up with problem of generalizability due to small sample size selected(30). Another cross-sectional surveys conducted in Guinea had number of limitations like inconsistency indicators collected, sample selected from known highly-endemic villages based on previous survey data that may have overestimated the true trachoma prevalence and using the projected populations in the survey years that may have caused inaccurate estimation(31).

Community-based cross-sectional study conducted in Amhara regional state in Gazegibela district indicated relatively small number of participants and lacks generalizability. Other similar study conducted in Zala district of Gamo Gofa Zone have a weakness of polymerase chain reaction test were not done to confirm ocular chlamydia infection(5,13).

Study done at Baso Liben District of East Gojjam was estimated of economic status, distance of water source and average monthly income of study households, which may be uncertain. Other problem was that positive result of trachoma status did not confirmed by laboratory tests so that differential diagnosis may exaggerate the result(26). Similar study conducted at Gondar Zuria District introduced social desirability bias due to lack of qualitative data to triangulate the result obtained in this study and usage of community nurses as data collectors.

2.2 Prevalence of Trachoma

A Cross-sectional study conducted on Geographical Distribution and Burden of Trachoma in Africa showed the current 129.4 million people live in areas of Africa are confirmed as trachoma endemic and TF prevalence is greater than 5% in children(32). A population based survey conducted in other part of Africa in Central and Southern Malawi revealed that the prevalence of active trachoma among 1-9 years old was 13.6% in Chikwawa and 21.7% in Mchinji (30).

Another cross-sectional surveys conducted in Guinea indicated that trachoma was indeed a public health problem with the prevalence of TF in children aged 1-9 years old was 1.0% in Yomou district and 41.8% in Dabola(31). A follow-up impact survey conducted in the Kayes, KeÂnieÂba, Nioro and YeÂlimaneÂ health districts of Mali indicated that the prevalence of TF was 0.53%, 0.81%, 0.23% and 0.31% for the districts of Kayes, KeÂnieÂba, Nioro and YeÂlimaneÂ respectively(33).

A population based cross sectional study conducted in Ethiopia revealed that the prevalence of active trachoma was (40.14%) among rural children aged 1-9 years old. In the occurrence of active trachoma; the highest prevalence was in Amhara (62.6%), Oromia (41.3%), SNNP (33.2%), Tigray (26.5%), Somali (22.6%) and Gambella (19.1%)(19).

A community-based cross-sectional study conducted in Amhara regional state among children in Gazegibela district revealed that prevalence of active trachoma among children aged 1–9 years of was 52.4 % .The prevalence among children of aged 1–4 years was higher than among children aged 5–9 years (13). Similar study conducted at Leku town revealed that prevalence of active trachoma among 1-9 years old children was 11%(3).

Other community-based cross-sectional study conducted in Zala district of Gamo Gofa Zone identified that the overall prevalence of trachoma among children aged 1–9 years was 36.7%(5). similar cross-sectional study done in Harari Region, Eastern Ethiopian among Primary School Children revealed that the prevalence of active trachoma was 1.3%(34).

Community-based cross-sectional study conducted in Baso Liben District of East Gojjam indicated the overall prevalence of active trachoma was 24.1%.(26). Similar study conducted in

North and South Wollo Zones of Amhara Region, showed the prevalence of active trachoma among children aged 1–9 was 21.6%.

Community-based cross-sectional study conducted in Woliso Town, Central Ethiopia indicated the prevalence active trachoma was 20.4%(18). Similarly in Mojo and Lume districts of Ethiopia in the Lume and Mojo districts, the prevalence of TF among children between aged 1-9 years old is 13 %(25).

2.3. Overview of Risk Factors for Trachoma

Trachoma generally occurs in dry, dusty environments and is strongly associated with poor living conditions and sanitation. Crowding of households, limited water supply for bathing and general hygiene, poor waste disposal systems and high numbers of flies have all been associated with trachoma prevalence. Children have more frequent and longer-lasting episodes of infection than adults and are believed to be the main community reservoirs of infection(28).

2.2.1. Individual hygiene factors

A number of cross sectional study indicated the prevalence of trachoma is consistently found to be highest in young children aged 1-9 years (18,24,35,36). The possible risk factors identified were discharge on the eye, flies on the face and unclean face of children(3,5,24,35). A number of study revealed that children from household heads/care givers having inadequate knowledge about trachoma were more likely to develop trachoma compared with children from household heads who had adequate knowledge(5,26,37,38).

2.2.2. Housing Factors

A house which lacks effective sanitation and adequate water supplies encourages transmission of trachoma. Another factor associated with transmission of trachoma is the presence of animals kept near to dwellings and piles of animal dung provide breeding places for flies (1,16,18,39). Households cooked in the living area with an open fire. Type of water sources and average daily water consumption, traveled to fetch water are the risk factors in some(1,11,13,35,38) studies. The Muscidae fly *Musca sorbens*, which is strongly attracted to and feeds on human secretions, acts as a vector in the transmission of ocular *C. trachomatis* (5). Fly density has in turn been associated with increased number of flies on the face which is a common risk factor for active trachoma. Human faecal material in and around the household introduced by open defecation

provides the favored breeding material for M sorbens and its presence has been associated with an increased prevalence of active trachoma(2,16,26).

2.2.3. Socio-Demographic Risk Factors

A number of study indicated that lack of education, including health education is associated with an increased risk of trachoma in communities. This is especially recognized in relation to inadequate education among mothers. Economically poor communities are at greater risk of trachoma as their lifestyle is characterized by a deprived social status. All age groups may be affected by trachoma but there is high prevalence among children aged 1-9 years old (18,24,26,35,36). There are also study that revealed sex as associated risk factors for trachoma among children aged 1-9 years old (13,36,40).

2.2.4. Water, Sanitation and Hygiene (WASH) and Environmental Factors

Available water increases the likelihood of good sanitation and good personal hygiene. It is very important to improve both personal hygiene within families and also environmental sanitation. The prevalence of active trachoma was higher among children from households daily water consumption is low and disposes of solid and liquid waste in open field. Furthermore, the prevalence was higher among children who washed their face once or no per a day, didn't use soap during face washing, had an unclean face(3,13,26) and among children from households without or not using of latrine (3,13,27,37,40,41).

2.2.5 Conceptual Framework

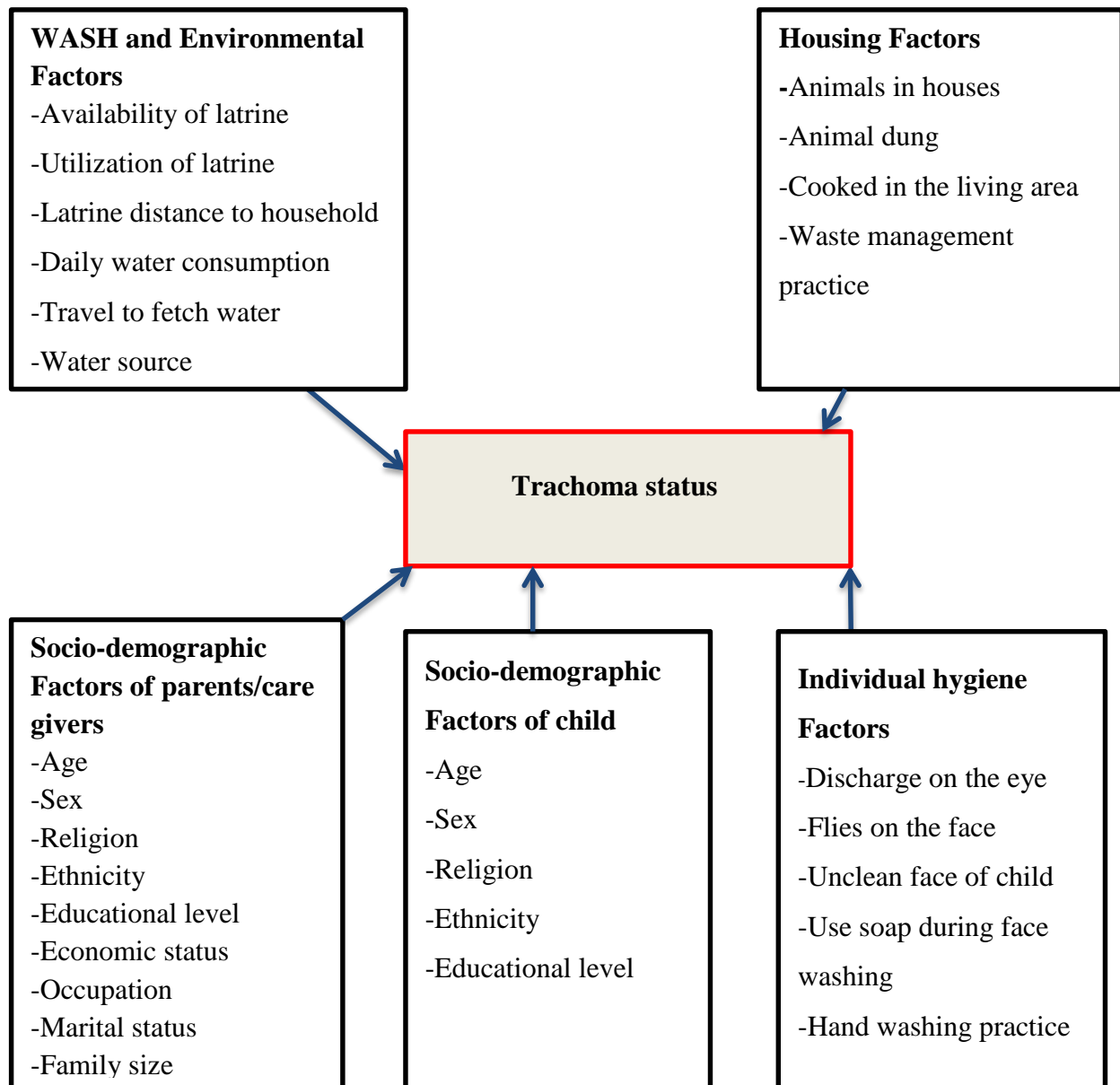


Figure 1: Conceptual frame work adopted from different literatures showing trachoma and associated factors.

CHAPTER THREE: OBJECTIVES

3.1. General objective

To assess prevalence and identify risk factors for trachoma among children in rural residents of Meta Robi District, Oromia Regional state, 2019.

3.2. Specific objectives

To assess prevalence of Trachoma among children in rural residents of Meta Robi District, Oromia Regional state, 2019.

To identify the risk factors for Trachoma among children in rural residents of Meta Robi District, Oromia Regional state, 2019.

CHAPTER FOUR: METHODS

4.1. Study area and period

The study was carried out in Meta Robi district, West Shoa Zone, Oromia Regional state, Ethiopia from March 01 to April 15, 2019. Meta Robi district is located 101 km west of Addis Ababa the capital city of Ethiopia and 153 km from Zonal city Ambo. The district is bordered in the south by Ejere district, in the West by Jeldu district, in the north by North Shoa zone and in the East by Meta Wolkite and Adea Berga districts. The area has three agro-climatic divisions: 11% low land, 41% medium land 48% highland with a land of 1500–2500 meters above sea level. The district was administratively divided into 26 kebeles (lowest administrative units) in Ethiopia. There are 23 rural and three urban kebeles. The district has 109,526 total populations (51% female and 49% male). The number of children aged 1–9 years was about 34,147 (unpublished District health desk information).

Approximately 97% of the population lives in rural part of the district. The district has three health centers and 26(23 rural and three urban) health posts, and three private clinics with potential health service coverage of 91%. Only 37% and 56.5% of the district have access to latrine and safe water respectively.

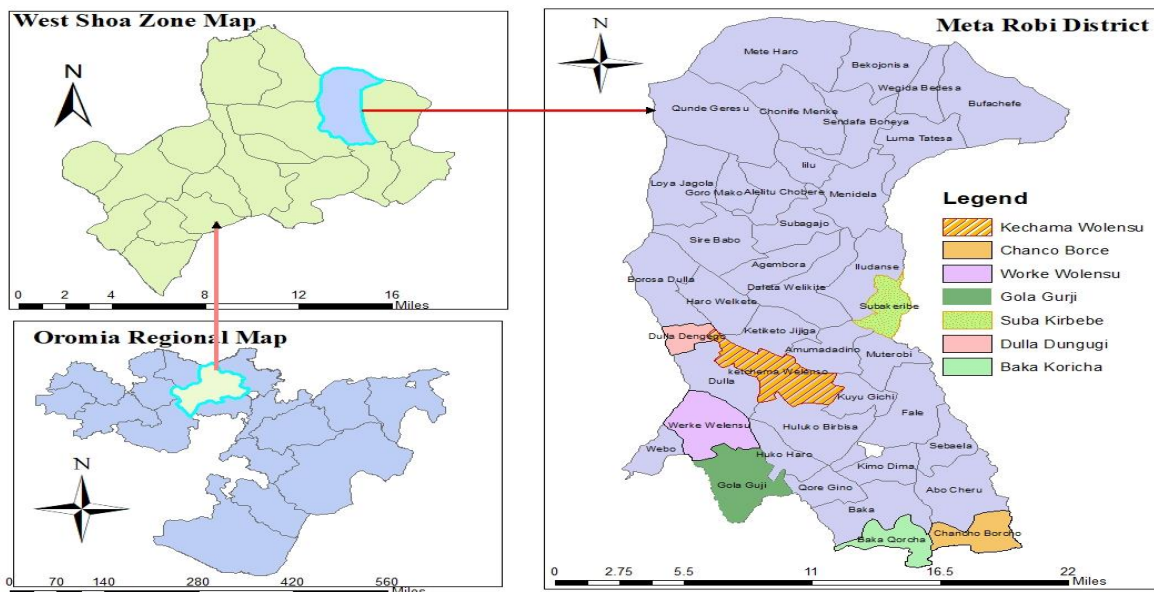


Figure 2 Map of Meta Robi district, West Shoa Zone, Oromia Regional State, 2019

4.2. Study design

A community based cross-sectional study was used.

4.3. Source Population

All children aged 1-9 years residing in rural of Meta Robi District, Oromia Regional state, Ethiopia, 2019.

4.4. Study Population

All children aged 1–9 years and their mothers/care givers in selected kebele of Meta Robi District, Oromia Regional state, Ethiopia, 2019.

4.5. Study unit

The study population was selected children with aged 1–9 years and their mothers/care givers who fulfill the eligibility criteria.

4.6. Eligibility Criteria

4.6.1. Inclusion criteria

Those who lived in the kebele at least for the last six months prior to study were included.

4.6.2. Exclusion criteria

Those who are severely ill, have mental illness, unable to communicate and cannot undergo examination was excluded.

4.7. Sample size and Sampling technique /Sampling procedures

Sample size for the first objective (prevalence)

By using single population proportion formula

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

with the assumption of 95 % confidence interval, 0.05 margin of error and considering 18.6% prevalence rate taken from a study done in Rural Children in Dera district, Northwest Ethiopia(24).

$$n = \frac{(1.96)^2 * 0.186(1-0.186)}{(0.05)^2}$$

$$n=233$$

Considering 10% non-response rate ($233*0.1=23$), sample size was $23+233=256$

By considering design effect of 1.5, final sample size was $= 256*1.5=384$

Sample size for the second objective (risk factors)

By taking 95% confidence interval, 80% power of the study and by using double population formula, the sample size is calculated by STATCALC program of EPI INFO version 1.1.7.14.

Table 1 Summary of calculated sample size for the three trachoma risk factors, 2019

Variables	Parameters		Sample size	Non response rate 10%	Design effect 1.5	Final sample size	Reference
	Proportion	Ratio					
Discharge on the eye	P1=35.3 P2=64.7	4.07	159	$159 \times 0.1 = 16$	$175 \times 1.5 = 263$	$16 + 263 = 279$	(24)
Cleanness of face	P1=27.1 P2=72.9	2.77	55	$55 \times 0.1 = 6$	$61 \times 1.5 = 92$	$6 + 92 = 98$	
Feces around the main house	P1=62.4 P2=37.6	3.07	189	$189 \times 0.1 = 19$	$189 \times 1.5 = 312$	$19 + 312 = 331$	

Since the sample size calculated by first objective (prevalence of trachoma) is greater than that of the second objective (risk factors) the final sample size was **384**.

A multistage sampling technique was used to select study subjects. Out of 23 kebeles found in Meta Robi District, Seven kebeles was selected by using simple random sampling method. The total sample size was allocated proportionally to the selected kebeles according to their household numbers. A total of 6,491 households are present in the selected seven kebeles. From each selected kebele one Gott was selected by simple random sampling method. A total of 2,164 households were present in the selected seven Gott and 384 households were selected by systematic random sampling and in each selected households one child was selected. In more than one child in the selected house hold, simple random sampling technique was used.

The procedure applied to get the first households of the first study subjects, first central point in each selected kebele and a place in the kebele where approximately an equal number of households were identified in all of the four directions. Then, by spinning a pencil on a clipboard, a direction was identified and the first household out of the first six household was selected as starting point. Every sixth household was identified for inclusion into the study on an approximately straight line pattern in each kebele. Six households on the selected direction were listed and a random start household number was identified by lottery method. Then, every sixth

household was selected and included into the study. This procedure was continued in all the selected kebeles until the required sample size was gained for each of the kebeles.

Schematic diagram for sampling technique

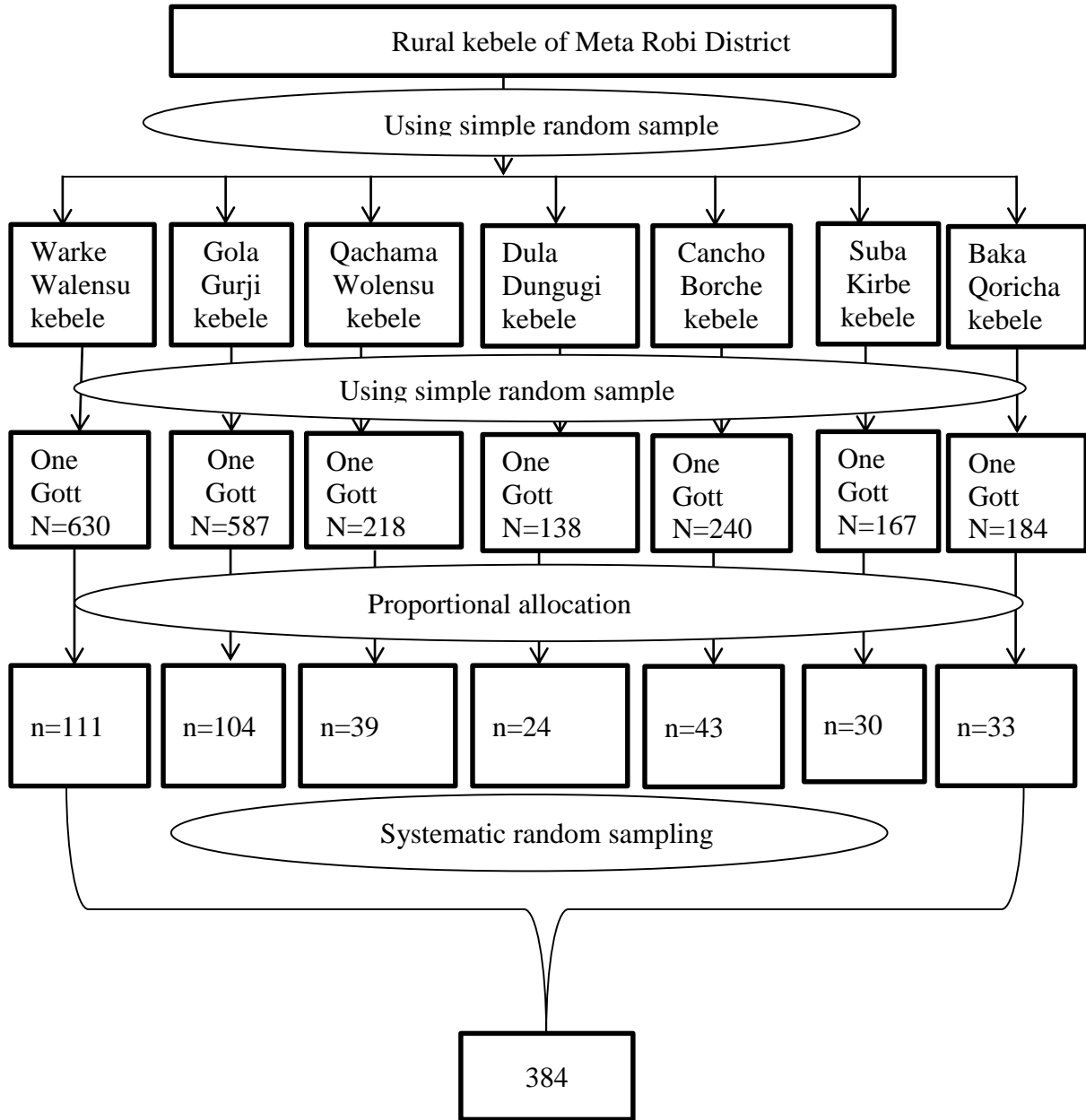


Figure 3 Schematic Diagram for sampling procedures to select study subjects

4.8. Data collection procedures (Instrument, personnel, data collection technique)

Interview administered structured questionnaire was used to collect data on Socio-demographic factors of parents/care givers, Socio-demographic factors of child, Individual hygiene factors, WASH and Environmental factors and Housing factors. Observation and clinical eye examination was done for the presence of trachoma. Language experts translated the questionnaire from English to Afan Oromo and back translated to English to ensure consistency. Pretest was conducted on 5% of the total sample size in **Kilbe** kebele which is adjacent to the district and was used the revised questionnaire for final data collection. One public health experts and two trained data collectors (ophthalmic nurses) were recruited for supervision and data collection, respectively. The investigator was coordinated the overall activities of data collection.

Following the face-to-face interview, trained clinical ophthalmic nurses was done ocular examination by following standard operative procedures (SOP).

Standard Operative Procedures (SOP)

- Each eye must be assessed separately
- Binocular loupes (X2.5) and adequate lighting are essential to be used.
- Wash hands with soap and water or alcohol based hand wash, rinse off hand wash.
- Signs must be clearly seen for trachoma to be reported as present
- Refer to the WHO simplified trachoma grading(42)
- Observe and record facial cleanliness (Is there 'sleep', dirt or crusting around the eyes
- Evert the right upper eye lid, examine and record the presence of TF, TI
- Evert the left upper eye lid, examine and record the presence of TF, TI

The clinical ophthalmic nurses was performed a detailed ophthalmic examination with strict adherence to standard methods and procedures. Ophthalmic nurses was used an ophthalmoscope, pen torch, and binocular loupe that has 2.5× magnifying power to identify clinical signs of trachoma: Trachomatous inflammation-intense (TI) and Trachomatous inflammation-follicular (TF)(42). Eyelid eversion (turning out) was done using an aseptic technique using cotton tip applicators and alcohol was used for hand disinfection. The guide used for diagnosis and reporting of eye examination results was the simplified trachoma grading scheme, which was developed by WHO for field work(42). After clinical eye examinations and referring to WHO

trachoma grading scheme with the identified sign and symptom, the presence of trachoma was reported/ determined.

4.9. Study variables

4.9.1. Dependent variable

- Trachoma status

4.9.2. Independent variables

Socio-demographic factors of parents/care givers

- Age
- Sex
- Religion
- Ethnicity
- Educational level
- Economic status
- Occupation
- Marital status
- Family size

Socio-demographic Factors of child

- Age
- Sex
- Religion
- Ethnicity
- Educational level

Individual hygiene Factors

- Discharge on the eye
- Flies on the face
- Unclean face of child
- Use soap during face washing
- Hand washing practice

Housing Factors

- Animals in houses
- Animal dung

- Waste management practice
- Cooked in the living house

WASH and Environmental Factors

- Availability of latrine
- Utilization of latrine
- Latrine distance to household
- Daily water consumption
- Travel to fetch water
- Water source

4.10. Operational definitions

Active trachoma: Children who have Trachomatous inflammation – Follicular or Trachomatous inflammation intense

Water source: Water from any location, pipe, protected dug wells, protected springs, unprotected dug wells, unprotected springs, and surface water(23).

Water consumption: is using water into the house for the purposes of drinking, cooking, bathing and washing in liter per person per day usually about 15 liters.

Distance to water: Time take to fetch water from its source for domestic use taking greater than 30 minutes or less to collect drinking water from the residents. If it takes greater than 30 minute, older adults, orphans, people living with disability may be less able to access and carry water, and therefore particularly vulnerable to household water insecurity(43). If it takes less than 30 minute it can improve the quality and quantity of water supply on premise.

Hand washing practice: Washing hands with water and soap at critical time (before face washing, after toilet use and after working in the field)(44).

Face washing practice: Washing face with water and soap at critical time at morning and after working in the field

Latrine distance: Maximum distance between latrine to house hold at 10 meter or greater. If the distance between latrines to house is less than 10 meter, allows flies to be in the house and frequent exposure of the children to the flies possibly made them develop trachoma. If distance between latrines to house is greater than 10 meter the probabilities of flies to be in the house is less and also decrease the chance of children exposure to flies.

Latrine use: Use of an improved latrine facility for the safe disposal of human waste (feces and urine). In the compound and show at least one sign of use (foot path to the latrine not covered by grass, the latrine is smelly, presence of anal cleansing material, fresh feces in the squatting hole, and the slab is wet).

Improved latrines: Facilities that ensure hygienic separation of human excreta from human contact.

Clean face- child who does not have an eye discharge or nasal discharge at the time of the study.

Free from active trachoma-children that do not have signs and symptoms of active trachoma.

Care givers - The mother, father or others, who take care of children most of time.

TF Trachomatous inflammation-follicular: 5 or more follicles in the upper tarsal conjunctiva. Follicles must be more than 0.5mm in diameter.

TI Trachomatous inflammation-intense: Pronounced inflammatory thickening of tarsal conjunctiva which obscures more than half of the normal deep tarsal vessels.

4.11. Data quality management

To ensure the quality of the data, the questionnaire was prepared first in English and then translated into Afan Oromo for field work purpose and back translated to English to ensure consistency. During this time some questions which are not understandable by the respondents were corrected based on the pretest findings. During the course of the data collection, facilitator was supervised at each site. The principal investigator was also closely supervised the field activity on daily basis and checking the completeness of filled questionnaire and whether recorded information makes sense to ensure the quality of collected data. For ocular eye examination, the standard operative procedure was followed.

4.12. Data analysis procedures

Data was edited and cleaned for inconsistencies and missing values and then entered using EpiData version 3.1 and then exported to SPSS version 21 for analysis. Both descriptive and analytical statistical procedures were utilized. Descriptive statistics like frequency distribution (measure of central tendency and measure of dispersion) was used and presented by using table, graph and texts. Bivariate logistic regression analysis was done candidate variables at p value <0.2. Variables with P-value <0.2 in bivariate analysis was considered as candidates and was entered into multivariable logistic regression model. But, before taking variables to multiple logistic regressions, multicollinearity was checked for each pair of independent variables using collinearity diagnostic test in linear regression model using Variance Inflation Factor (VIF). The

result of collinearity diagnostic test (VIF) at greater >10 was considered that, there is multicollinearity and in this study all the VIF result were less than ten. Interaction was also checked, by Breslow-Day test (CROSS TAB) that calculate crude odd ratio and stratum specific OR and there was no interaction in this study.

The variables were being entered to the multivariable model using the backward elimination method. The necessary assumption of the logistic regression model was checked by Hosmer and Lemeshow goodness of fit test statistics and is fitted well at p-value of 0.471. P-value <0.05 in multivariable logistic regressions was considered as statistically significant. Adjusted odds ratios (AOR) with 95% confidence interval (CI) were used in identifying factors associated with active trachoma.

4.13. Ethical consideration

Ethical approval and clearance was obtained from Jimma University Ethical Review Board. Permission to conduct the research was obtained from the West Shoa Zonal health bureaus and respective health offices. Before the commencement of data collection, from each Head of the house hold or care givers, verbal consent was obtained. Children diagnosed with active trachoma were referred to nearby health centers for treatment.

4.14. Dissemination plan

The research finding is going to be shared to Meta Robi district health office, West Shoa zonal health office, being shared to Jimma University department of Epidemiology and an attempt will be made to publish on scientific journal.

CHAPTER FIVE: RESULTS

5.1. Socio-demographic characteristics of respondents (parents/care givers)

From the recruited respondents, 380 are participated in study which gives response rate of 98.9%. Out of these, 355 (93.4%) of them were from a married family and 212 (55.8%) were from a family containing greater than five members. Regarding the educational status of their parents, 296(77.9%) were primary and 84(22.1%) of them cannot read and write.

The mean age of respondents was 38.76 years with standard deviation of ± 8.19 . Among total respondents 215(56.6%) were male. From respondents, majority 377(99.2%) were Oromo ethnic and 190 (50%) were orthodox Christian followers. Forty one (10.3 %) respondents had greater than two children aged <10 year. The mean family size of respondents in the district was 5.3. Two hundred seventy nine (73.4%) of respondents were farmers. The average monthly income of most respondents 185 (48.7%) was greater than or equal to 650 Ethiopian birr (ETB). The age distribution showed that, out of the total study subjects, 176 (46.3%) were within the age group between 1 and 5 years and children between 6 and 9 years of age comprised 204(53.7%) (Table2).

Table 2 Socio-demographic characteristics of respondents (parents/care givers) and children in rural resident of Meta Robi District, West Shoa Zone, Oromia, 2019

S/ N	Variables		Trachoma		
			Negative	Positive	Total (%)
1	Sex of respondent	Male	197(56.9%)	18(52.9%)	215 (56.6%)
		Female	149(43.1%)	16(47.1%)	165 (43.4%)
2	Ethnicity of respondents	Oromo	344(99.4%)	33(97.1%)	377 (99.2%)
		Amhara	2(0.6%)	1(2.9%)	3 (0.8%)
3	Occupational status respondents	Student	14(4.0%)	10(29.4%)	24 (6.3%)
		Farmer	265(76.6%)	14(41.2%)	279 (73.4%)
		Merchant	67(17.6%)	10(29.4%)	77 (20.3%)
4	Family size of respondents	≤5	151(39.7%)	17(4.5%)	168 (44.2%)
		>5	195(51.3%)	17(4.5%)	212 (55.8%)
5	Educational status respondents	Illiterate	70(20.2%)	14(41.2%)	84 (22.1%)
		Primary and above	276(79.8%)	20(58.8%)	296 (77.9%)
6	Monthly income of respondents	≤ 350 ETB	43(12.4%)	11(32.4%)	54(14.2%)
		351-450	45(13.0%)	7(20.6%)	52(13.7%)
		451-650	81(23.4%)	8(23.5%)	89(23.4%)
		>650	177(51.2%)	8(23.5%)	185(48.7%)
7	Religion of respondents	Orthodox	170(49.1%)	20(58.8%)	190 (50.0%)
		Protestant	149(43.1%)	11(32.4%)	160 (42.1%)
		Wakefeta	27(7.8%)	3(8.8%)	30 (7.9%)
8	Number of children aged 1-9	≤2	313(90.5%)	26(76.5%)	339(89.2%)
		>2	33(9.5%)	8(23.5%)	41(10.8%)
9	Age of child	1-5	166(48%)	10(29.4%)	176(46.3%)
		6-9	180(52%)	24(70.6%)	204(53.7%)

5.2 Characteristics of children

Of 380 children examined for trachoma, 232 (61.1%) were males from which 204(53.7%) of them were age 6-9 years old. From the total children examined, 346(91.1%) children washed face a day (Figure 4). Majority 331(89.9%) of examined children used soap for face washing. Only 35 (10.1%) of children do not used soap for face washing.

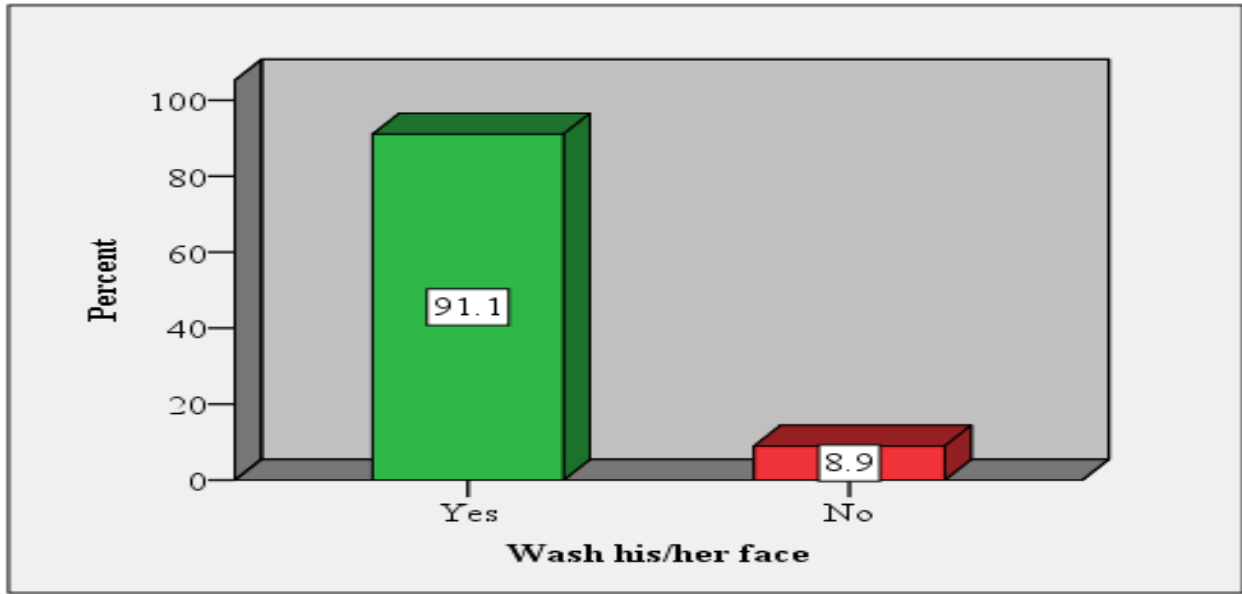


Figure 4 Face washing practice of children in rural residents of Meta Robi District, West Shoa Zone, Oromia Regional state, 2019

From 346 children washed face, 311 (89.9%) of them face washed ≥ 2 times per day, whereas the remaining 35 (10.1 %) washed their face only once daily (Figure 5). Of 380 children, about 35(9.2%) of them had discharge on their face.

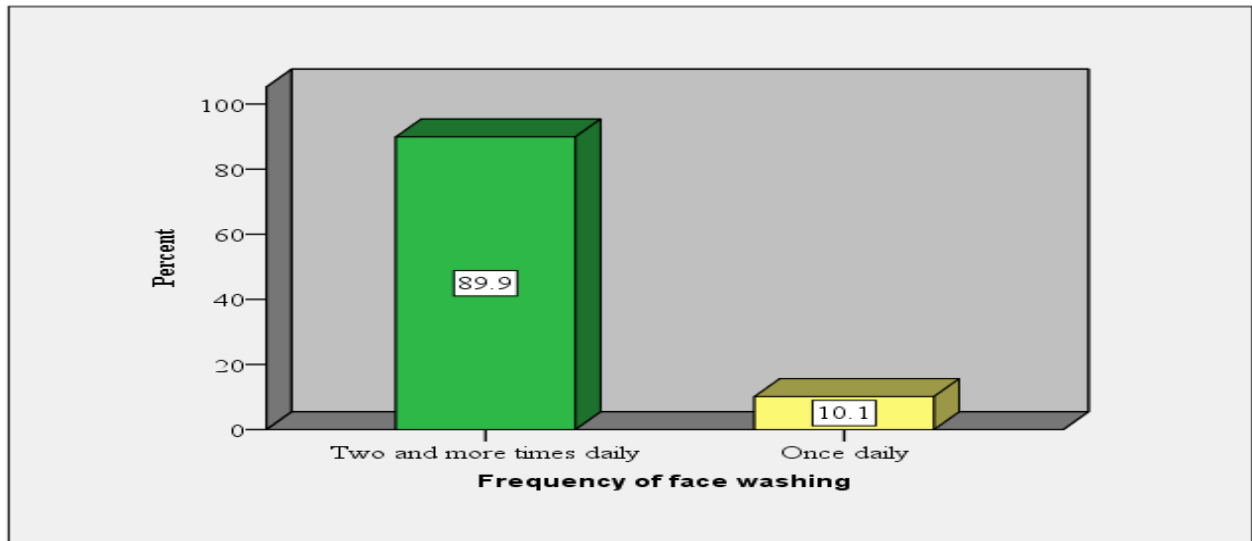


Figure 5- Face washing frequency of children in rural residents of Meta Robi District, West Shoa Zone, Oromia Regional state, 2019

5.3 Environmental and housing condition of the selected households

Out of the total respondents, 227 (59.7%) were getting water from protected spring. Two hundred seventy two (71.6%) respondents in the study areas get their water traveling for less than 30 minute. The remaining 108 (28.4%) gets water by travelling greater than 30 minute away from their home to fetch water for their daily consumption. Majority 331 (87.1%) of respondent's average daily water consumption was 40–60 liters/family and the remaining 49(12.9%) daily water consumption was less than 40 liters/family. Regarding to waste management, 146 (40.9%) of them dispose solid waste by burning and 284(82.3%) of respondents have liquid waste disposal pits. At the time of the study, 336(94.1%) respondents had functional latrine. Two hundred eighty three (84.2%) of the respondents have latrine and utilized by both adults and children. Two hundred forty four (64.2 %) of respondents cook food in separate room which have window while the remaining 136 (35.8 %) cook food in separate room which have no window. More than half of the respondents 276 (64.7%) live in households with less than two room. From the total respondents, majority 332 (87.4%) had cattle and only 49 (14.7%) of them live in the same rooms with cattle.

5.4 Prevalence of trachoma among children aged 1-9 years old in rural residents of Meta Robi District, Oromia Regional state, 2019.

Enumerated children aged 1–9 years were examined for signs of trachoma. The signs of trachoma, TF and TI were assessed in children 1–9 years of age regardless of gender. Overall prevalence of trachoma among children aged 1–9 years in rural children of Meta Robi district was 34(8.9%) (95% CI; 6.3-11.8) from which 20 (5.2%) were male children (figure 6).

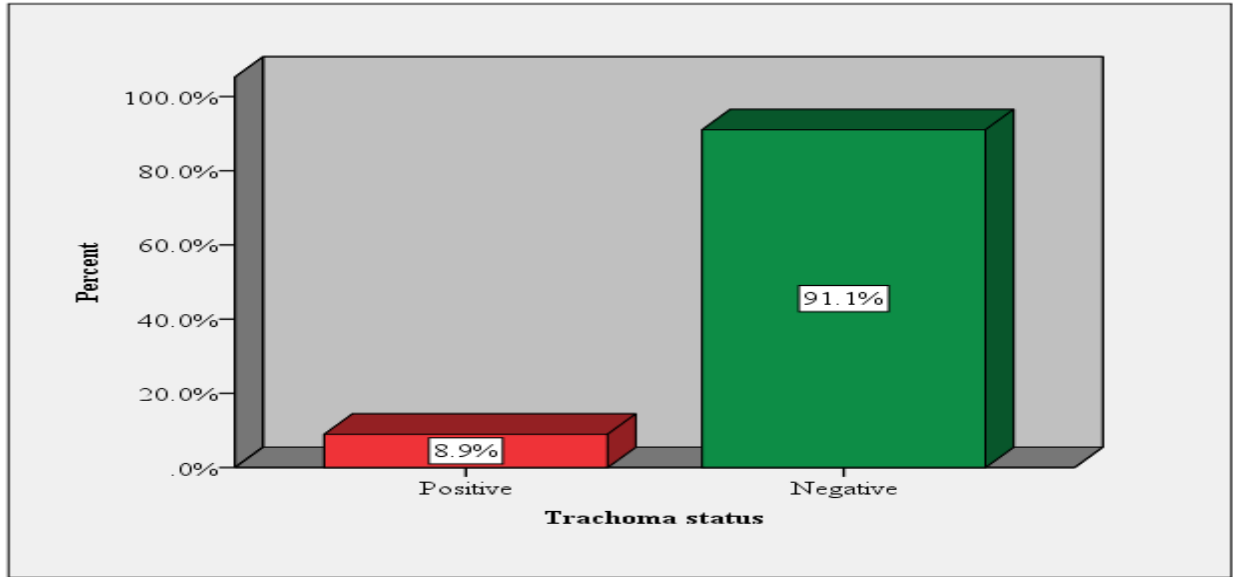


Figure 6 Prevalence of trachoma in children 1–9 years of age in Meta Robi District, West Shoa Zone, Oromia Regional state, 2019

The prevalence of trachoma among children of aged 1–5 and 6–9 years was 10 (2.6 %) and 24 (6.3 %) respectively (Figure 7).

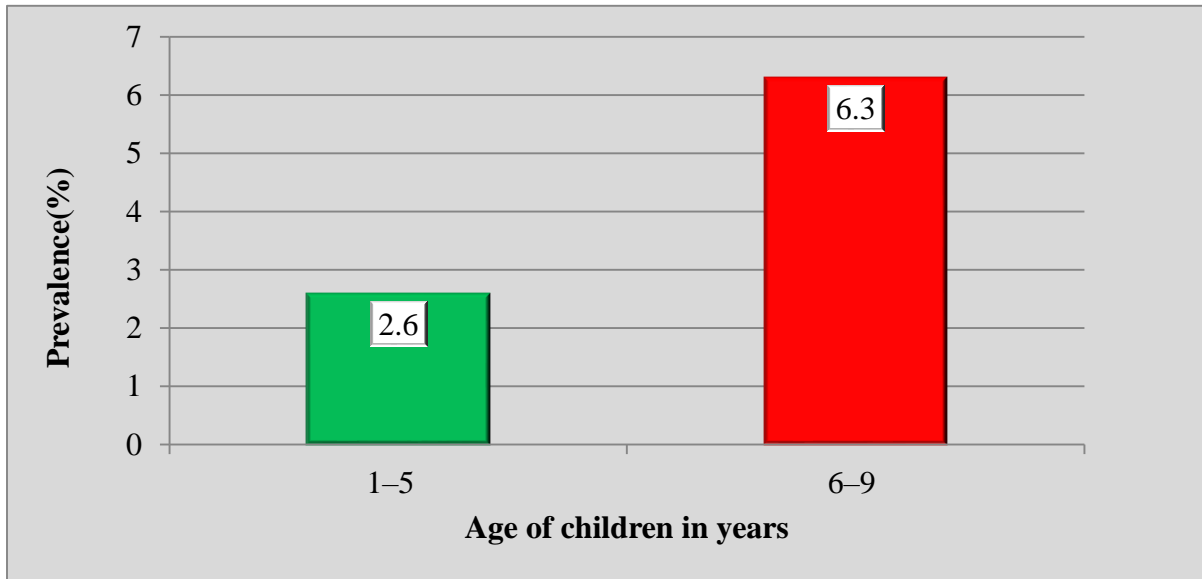


Figure 7 Prevalence of trachoma by age in children 1–9 years of age in Meta Robi District, West Shoa Zone, Oromia Regional state, 2019

5.4 Risk factors for Trachoma

5.4.1 Risk factors associated with trachoma in children 1–9 years of age at Bivariable logistic regression.

Bivariable logistic regression analysis of possible explanatory variable of trachoma was carried out on socio-demographic characteristic and other variables. Reference category was selected based on the prevalence of trachoma within each independent variable. Based on this assumption, the high prevalence of trachoma within the selected independent variable was taken as reference.

The result of bivariate logistic regression analysis revealed that, hand washing practice of child, discharges on the faces child, sex of child, cooking place, absence of liquid waste disposal site, absence of solid waste disposal site, presence of fly breeding site, absence of latrine, time to fetch water, age of child, occupational status of respondents, total number of children aged 1-9 in house hold and monthly income of respondents were candidate variable for multivariable logistic regression(Table 3).

Table 3 Candidate variable for multivariable analysis by binary logistical regression in rural resident of Meta Robi District, Oromia Regional state, 2019

Variables		Trachoma status			
		Positive	Negative	COR(95% CI)	P-value
Educational status of respondents	Illiterate	14(41.2%)	70(20.2%)	1	0.007
	Primary and above	20(58.8%)	276(79.8%)	0.321(0.174-0.753)	
Occupational status of respondents	Student	10(29.4%)	14(4.0%)	1	0.000
	Farmer	14(41.2%)	265(76.6%)	0.074(0.028-0.196)	
	Merchant	10(29.4%)	67(17.6%)	0.209(0.073-0.596)	
Total number of children aged 1-9	≤2	26(76.5%)	313(90.5%)	0.343(0.144-0.818)	0.016
	>2	8(23.5%)	33(9.5%)	1	
Monthly income of respondents	≤ 350 ETB	11(32.4%)	43(12.4%)	5.66(2.146-14.927)	0.000
	351-450	7(20.6%)	45(13.0%)	1.645(0.584-4.633)	0.347
	451-650	8(23.5%)	81(23.4%)	2.590(0.969-6.922)	0.058
	>650	8(23.5%)	177(51.2%)	1	
Hand washing practice of child	Yes	16(47.1%)	221(63.9%)	1	0.057
	No	18(52.9%)	125(36.1%)	1.989(0.980-4.039)	
Discharges on the faces child	Yes	22(64.7%)	133(38.4%)	1	0.004
	No	12(35.3%)	213(61.6%)	0.341(0.163-0.711)	
Sex of child	Male	18(52.9%)	214(61.8%)	0.694(0.342-1.408)	0.311
	Female	16(47.1%)	148(38.2%)	1	
Age of child	1-5 yrs.	10(29.4%)	166(48.0%)	0.452(0.21-0.97)	0.042
	6-9 yrs.	24(70.6%)	180(52.0%)	1	
Presence of liquid waste disposal site	Yes	19(55.9%)	265 (76.6%)	0.387(0.188-0.796)	0.010
	No	15(44.1%)	81 (23.4%)	1	
Presence of solid waste disposal site	Yes	18(52.9%)	261(75.4%)	0.366(0.179-0.750)	0.006
	No	16(47.1%)	85(24.6%)	1	
Presence of fly breeding site	Yes	20(58.8%)	57 (16.5%)	1	0.000
	No	14(41.2%)	289 (83.5%)	0.138(0.066-0.289)	
Presence of latrine	Yes	25(73.5%)	332(96.0%)	0.117(0.046-0.297)	0.000
	No	9(26.5%)	14(4.0%)	1	
Time to fetch water	≤30 Minute	18(52.9%)	254(73.4%)	0.407(0.199-0.832)	0.014
	>30 minute	16(47.1%)	92(26.6%)	1	

5.4.2 Risk factors associated with trachoma in children 1–9 years of age at multivariable logistic regression.

To control confounder multivariable logistic regression analysis of possible explanatory variables of trachoma was carried out on socio-demographic characteristic and other variables.

The result of multivariable logistic regression analysis revealed that, occupational status of respondents, total number of children aged 1-9 years old, monthly income of respondents, presence of discharge on the face child, not having latrine and presence of fly breeding site were identified variables that are independently contributed to prevalence of trachoma in the study area (Table 4).

Children from family monthly income ≥ 650 ETB of respondents were 0.143 times (AOR= 0.143; 95% CI; 0.034-0.602) less developed trachoma than those from respondents who gets ≤ 350 ETB. Children from respondents those who were farmers were 8 times (AOR =8.169; 95% CI; 2.406-27.735) more developed trachoma than those from respondents who were students.

Children from respondents who had no latrine were found 4 times (AOR=4.255; 95% CI; 1.086-16.675) more developed trachoma than those children from respondents who had latrine. Children those who had no discharges on their eyes were 0.325 times less developed trachoma (AOR=0.325; 95% CI; 0.123-0.860) than those children who had discharges on their eyes.

Children from respondents who live in place where there was no fly breeding site (animal dung) had 0.118 times (AOR=0.118; 95% CI; 0.043-0.328) less developed trachoma disease than children from respondents those had place for fly breeding site.

Children from respondents those had a total number of children aged 1-9 years old greater than two were 4 times more developed trachoma disease (AOR= 4.029; 95% CI;1.082-15.007) than children from respondents who had a total number of children aged 1-9 years old less than two.

Table 4 Multivariable logistic regression analysis of associated factors with trachoma among children aged 1–9 years in rural residents of Meta Robi District, West Shoa Zone, 2019

Variables		Trachoma status			
		Positive	Negative	AOR(95% CI)	P value
Occupational status of respondents	Student	10(2.6%)	14(3.7%)	1	
	Farmer	14(3.7%)	265(69.7%)	8.169(2.406-27.735)**	0.001
	Merchant	10(2.6%)	67(17.6%)	0.316(0.076-1.308)	0.112
Total number of children aged 1-9	≤2	26(6.8%)	313(82.4%)	1	
	>2	8(2.1%)	33(8.7%)	4.029(1.082-15.007) *	0.038
Monthly income of respondents	≤ 350 ETB	11(2.9%)	43(11.3%)	1	
	351-450	7(1.8%)	45(11.8%)	0.272(0.064-1.163)	0.079
	451-650	8(2.1%)	81(21.3%)	0.143(0.034-0.602) *	0.008
	>650	8(2.1%)	177(46.6%)	0.265(0.068-1.037)	0.056
Presence discharge on the child's eyes	Yes	22(5.8%)	133(35%)	1	
	No	12(3.2%)	213(56.1%)	0.325(0.123-0.860) *	0.024
Presence of fly breeding site	Yes	20(5.3%)	57 (15%)	1	
	No	14(3.7%)	289 (76.1%)	0.118(0.043-0.328) **	0.000
Presence of latrine	Yes	25(6.6%)	332(87.4%)	1	
	No	9(31.5%)	14(3.7%)	4.255(1.086-16.675) *	0.038

**Significant at p-value ≤0.001, * significant at p-value ≤0.05.

CHAPTER SIX: DISCUSSION

Trachoma remains a major cause of avoidable blindness among rural populations in many areas of Africa including Ethiopia(16,45–48). The problem is severe if not detected and treated as early as possible especially in children aged 1-9 years old. The aim of this study was to assess the current prevalence and associated risk factors for trachoma among rural children in Meta Robi District, West Shoa Zone, Oromia Regional State following the introduction of an integrated national prevention and control program for the disease. This study revealed that the overall prevalence of trachoma among rural children aged 1–9 years was 8.9% (95% CI; 6.3-11.8); of which 52.9% were Trachomatous inflammation follicle the remaining 47.1% was Trachomatous inflammation intense. This was greater than the criteria for elimination of trachoma as public health problem, which showed that the prevalence of trachoma was > 5% in children aged 1-9 years old (49).

The findings of this study agreed with a Population-Based Prevalence Surveys Conducted in Bure district of Ilu Aba Bora zone, Oromia Regional State with the Global Trachoma Mapping Project, where the prevalence of trachoma among children aged 1-9 was 8.8% (50). However, the prevalence is much lower than was recorded in Gazegibela district of Wagehemra Zone, Amhara region where the prevalence of trachoma among children aged 1-9 was 52.4 % (13). The result of this study showed that the prevalence of trachoma was lower than a comparative cross-sectional study conducted among rural and urban children in Dera Woreda, Northwest Ethiopia which resulted the prevalence of trachoma was 18.6% (24) among rural children. The lower prevalence in this study may be attributed to the activities provided by ministry of health and non-governmental organizations in the form of mass chemoprophylaxis and health education for the community.

Concerning risk factors for the prevalence of trachoma, in this study children those who had no discharges on their eyes were 0.325 times less developed trachoma (AOR=0.325; 95% CI; 0.123-0.860) than those children who had discharges on their eyes. This finding is in line with the previous studies that indicated discharge on child' eye is significantly associated with trachoma(16,51). In line with this finding, a community based cross-sectional study conducted in Dera Woreda, Northwest Ethiopia showed children with discharge on their eyes were more developed trachoma than those without discharge(51). The possible explanation could be that

discharge on the child's eye can attract flies and the eye-seeking fly of the species *Musca sorbens*, is a possible mechanical vector of *Chlamydia trachomatis*. In addition, ocular discharge may result in an unclean face and attracts flies, which has been found to be associated with trachoma in different settings (38,45) in developing trachoma. The infected discharge would aid the transmission of trachoma through fingers, fomites, or flies.

This study showed children from respondents getting monthly income ≥ 651 ETB monthly were 0.143 times (AOR= 0.143; 95% CI; 0.034-0.602) less developed trachoma than those from respondents who get ≤ 350 ETB monthly. This finding is consistent with similar study conducted in Leku town, southern Ethiopia which indicated that developing of trachoma among children from high family income was less when compared to that of children from low respondent's family monthly income (3). The finding of this study is also supported by similar study conducted among 1-9 years old children in Gondar Zuria District North Gondar, Ethiopia that showed children who were living in households perceived their economy as poor or very poor were more risk than those who were living with households reported themselves as rich (47). This may be due to better chance of having personal cleanliness among children from rich respondents and poverty on health care, high chance of sharing tools, low immunity status and less access to communication media among children from poor on trachoma prevention.

The finding of this study showed that the odds of developing trachoma were 4 times more developed among children of respondents who had no latrine (AOR=4.255; 95% CI; 1.086-16.675) when compared with those from respondents who had latrine. The finding of this study is supported by similar studies conducted in Zala district, Gamo Gofa Zone, Southern Ethiopia and Baso Liben District of East Gojjam, Ethiopia among children aged 1–9 years old which revealed that the odd to develop trachoma among children from respondents who had no latrine was higher when compared with those children from respondents who had latrine (38,46). This could be due to inaccessibility to latrine facilities and frequent exposure of human feces which are risk factors for the presence of high number of fly to eyes that leads to high chance of transmission of trachoma.

In this study, children who were from respondents where there was no fly breeding site was 0.118 times (AOR=0.118; 95% CI; 0.043-0.328) less developed trachoma than children who

were from respondents where there was presence of fly breeding site. This finding is consistent with different studies which revealed the odds of trachoma among children whose respondents utilize a liquid waste disposal pit were less developed trachoma disease than children whose respondents who do not properly used a liquid waste disposal facility(16,39,47) which may be used as fly breeding site. The possible explanation is the presence of fly breeding site can increase the density of fly and increased frequent exposure of the children to the flies possibly made them to develop trachoma.

The result of this study indicated that, children from respondents those had a total number of children aged 1-9 years old greater than two were 4 times more developed trachoma disease (AOR= 4.029; 95% CI;1.082-15.007) than children from respondents of which had a total number of children aged 1-9 years old less than two. This finding is supported by other similar studies conducted in rural communities of Gonji Kolella district, West Gojjam zone, North West Ethiopia and Zala district, Gamo Gofa Zone, Southern Ethiopia which indicated in respondents those who had children greater than two of aged 1-9 years old had more trachoma than respondents who had children less than two of aged 1-9 years old (2,52). This could be due to the fact that increases in number of children aged 1-9 years old decreases care given to the children by the household members/care givers. Additionally, depletion of family resource as a result of caring for increased number of children aged 1-9 years old might increase the risk of exposure to poor hygiene and consequently to trachoma infection.

This study revealed that children from respondents those who were farmers were 8 times (AOR =8.169; 95% CI; 2.406-27.735) more developed trachoma than those from respondents who were students. This result agreed with similar study conducted in Gazegibela district of Wagehemra Zone, Amhara region, Ethiopia which resulted children from those respondents were farmers was more developed trachoma(48). The possible explanation could be poorer hygiene practices, less access to information, education and communication of respondents about how trachoma can be prevented that made the children being developed trachoma(48).

Limitations

This study has some important limitations that should be kept in mind when interpreting the results. The possible limitations of this study were estimation of latrine distance from households, time to fetched water and average monthly income of study participants. It was merely based on respondents' reply to the interviewer questions, which may be uncertain. Due small sample size included generalizability of the finding may be uncertain. Due to lack of sufficient resources the positive result of trachoma could not be confirmed by advanced laboratory tests so that differential diagnosis may exaggerate the result.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 CONCLUSION

The prevalence of trachoma among rural children aged 1–9 years old in the district was greater than WHO trachoma elimination cutoff point ($> 5\%$) which warrants the trachoma SAFE control strategy to be strengthened in the district. A number of risk factors were significantly associated with prevalence of trachoma in the district. These include monthly family income of respondents, occupational status of respondents, presence of fly breeding site, discharges on the eyes of child, total number of children aged 1-9 years old greater than two and absence of latrine were independently contributed to prevalence of trachoma in the study area.

7.2 RECOMMENDATIONS

Intervention modalities that would address the identified risk factors for trachoma were highly recommended to prevent and control prevalence of trachoma in this study setting. Since the prevalence of trachoma among rural children aged 1–9 years in the district was greater than WHO trachoma elimination cutoff point ($> 5\%$), the district health office should attention on an intervention with the A, F and E components of SAFE strategy. The district health office should strength health extension packages and community lead total sanitation and hygiene to reduce the burden of trachoma disease. District health extension worker should create awareness to the community to use locally available materials (like endod and ash) for personal hygiene. District health extension worker should also make the community to keep their environment clean (construction and maintenance of latrine, have solid and liquid waste disposal site, home health environment) and keep personal hygiene. District health extension worker should give health education on prevention and control of trachoma disease.

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ANNEXES

Annex I: Consent and information sheet

Verbal consent

Greeting

Hello! My name is _____. I'm data collector for the study on prevalence of Trachoma and factor affecting it. You are kindly requested to be included in the study, which will have importance in improving Trachoma prevalence and its associated factors. The interview will take about 30 minutes. No information concerning you, as individual will be passed to another individual or institution without your agreement. Your participation is voluntary and you have the right to not participate fully or partially. If you agree to be included in the study I will start my questions by asking general identification points. Only honest answers would contribute to improvement of health. The study has approval from Jimma University ethical review committee. Do you have any questions on what we talked so far?

“May I continue?”

If yes, continue interviewing

If No, thank and stop interviewing

Annex II Questionnaire

Identifiers

Woreda _____ Kebele _____ Gotte _____ House hold Head
 _____ Name of Supervisor _____ Name of Interviewer
 _____ Interview date ___/___/___ signature _____ supervised
 date ___/___/___ signature _____

Part I. Socio demographic information of parent/guardian or respondents of rural residents of Meta Robi District, West Shoa Zone, Oromia Regional State, Ethiopia, 2019

S/No	Questions	Response	Remark
200.	Age of respondents	_____ years old	
201.	Sex of respondents	1. Male 2. Female	
202.	Marital status of HH head/respondents	1. Single 2. Married 3. Divorced 4. Widowed	
203.	Religion of HH head/respondents	1. Orthodox 2. Protestant 3. Muslim 4. Wakefeta	
204.	Ethnicity of HH head/ respondents	1. Oromo 2. Amhara 3. Tigre 4. Gurage 5. Sidama	
205.	Occupation of HH head/ respondents	1. Student 2. Farmer 3. Merchant 4. Employed 5. Unemployed	

206.	Educational status of HH head/ respondents	1. Unable to read and write 2. Primary 3. Secondary 4. Collage 5. University(degree) 6. University(master)	
207.	Family monthly income	1. _____ETB	
208.	Family size	_____ (in number)	
209.	Are/is there children aged ≤ 9 years old in households	1. Yes 2. No	
210.	If yes to Q209 Number of children aged ≤ 9 years old in households	_____ (in number)	
211.	What is your relationship with the children?	1. Parent (Father) 2. Parent(Mother) 3. Guardian	
212.	Have you heard about trachoma?	1. Yes 2. No	
213.	If yes to Q 212 from where do you have heard about trachoma?	1 Television 2 Radio 3 Poster 4 Health worker 5 Other (specify).....	
214.	What are the sign and symptoms that make you think of trachoma?	1. Eyes become red 2. Pain inside of the eyes 3. Itch, bulge, water run out from eyes 4. Eye discharge 5. Unclear sights when it becomes darker 6. Don't know	

215.	Is trachoma transmitted?	1. Yes 2. No	
216.	If yes to Q215 how can it transmitted?	1. Touching infected eyes 2. Contact with contaminated pillows, clothes and towels 3. Feces breeding flies 4. By droplets 5. Others(specify)	
217.	Is trachoma preventable?	1. Yes 2. No	
218.	If yes to Q217 how can it be prevented?	1. Surgery 2. Antibiotics 3. Facial cleanliness 4. Environmental improvement	
219.	Do you wash your hands?	1. Yes 2. No	
220.	If yes to Q219, when you wash your hands?	1. Before food preparation 2. Before eating 3. After eating 4. Before feeding child, 5. After cleaning babies 6. After toilet use	

Part II. Socio demographic information of children of Rural residents of Meta Robi District, West Shoa Zone, Oromia Regional State, Ethiopia, 2019

221.	Age of child	1. _____ Years	
222.	Sex of child	1. Male 2. Female	

223.	Religion of child	1. Orthodox 2. Protestant 3. Muslim 4. Wakefeta	
224.	Ethnicity of child	1. Oromo 2. Amhara 3. Tigre 4. Gurage 5. Sidama	
225.	Educational status of child	1. Unable to read and write. 2. KG-1 3. KG -2 4. KG-3 5. Primary	

Part III Housing factors that might contribute to the occurrence of trachoma in rural residents of Meta Robi District, West Shoa Zone, Oromia Regional State, Ethiopia, 2019

226.	Number of living room	_____ In numbers	
227.	Cooking place	1. Separate Kitchen 2. In living room	
228.	Sources of energy for cooking	1. Fire wood 2. Charcoal	
229.	Window in cooking room	1. Yes 2. No	
230.	Is there liquid waste management site?	1. Yes 2. No	
231.	If yes to Q230, Methods of liquid waste disposal(observe)	1. In disposal pit 2. Open field 3. Within compound 4. sewer system	
232.	Is there solid waste management site	1. Yes	

	waste?	2. No	
233.	If yes to Q232, Methods of Solid waste disposal(observe)	1. Open field 2. Within compound 3. Burying 4. Collection site 5. Burning 6. Others	
234.	Fly breeding site(observe)	1. Yes 2. No	
235.	If yes to Q234, place of fly breeding	1. Animal dung 2. Open pit latrine 3. Decayed and rotted foods	
236.	Cattle ownership	1. Yes 2. No	
237.	If yes to Q 236 where cattle stay(observe)	1. Shelter constructed for cattle around the house 2. in the same living room the family living.	

Part IV Individual hygiene factors of the study participants in rural residents of Meta Robi District, West Shoa Zone, Oromia Regional State, Ethiopia, 2019

238.	Do study participant wash his/her hands?	1. Yes 2. No	
239.	If yes to Q239, when study participant wash his/her	1. Before eating 2. After eating 3. After toilet use	
240.	Do study participant wash his/her face?	1. Yes 2. No	

241.	If yes to Q241, frequency of face washing	1. Two and more times daily 2. Once daily 3. Not at all	
242.	Soap use during face washing	1. Yes 2. No	
243.	If yes to Q243, frequency of face washing using soap	1. Always 2. Sometimes	
244.	Discharges on the faces study participant	1 Yes 2. No	
245.	Presence of fly on the face of the study participant	1. Yes 2. No	

Part V. WASH and Environmental factors that might contribute to the occurrence of trachoma in rural residents of Meta Robi District, West Shoa Zone, Oromia Regional State, Ethiopia, 2019

246.	Presence of latrine(Observe)	1. Yes 2. No	
247.	If yes to Q 246 type of latrine	1 Covered traditional pit latrine 2 Uncovered traditional pit latrine	
248.	Latrine functionality(Observe)	1. Yes 2. No	
249.	If yes to Q248, who uses the latrine in the families	1. Only adults 2. Adults and children	
250.	Frequency of latrine use	1. Regularly 2. Not regularly	
251.	Latrine to household distance (meters)	_____meter	

252.	Sources of water(observe)	1. Pipe 2.Protected well 3.Protected spring 4. Unprotected spring 5.Unprotected well	
253.	Water consumption in liters/day/person	1. _____ litters	
254.	Time to fetch water	_____ minute	

Part VI. Prevalence of trachoma among children in rural residents in Meta Robi district based on WHO trachoma grading system, 2019

255.	Trachoma status/Result of examination	1. Positive 2. Negative	
256.	If positive to Q255, type of trachoma	1. Trachomatous inflammation follicular 2. Trachomatous inflammation intense	
257.	Sex of child for trachoma	1. Male 2. Female	
258.	Age of child	1 _____ Years	

Annex III AFAN OROMO VERSION QUESTIONNARIE

Guca Odeeffennoo fi waliigaltee Hirmaattotaa

Harka Fuune! Ani maqaankoo _____ Jedhama. Ani obbo Dassaalee Leellisatiif qorannoo isaanii faca'insa dhukkuba Tiraakoomaa fi wantoota dhukkuba kanaaf sababa ta'an irratti barnoota isaanii digirii lammaffaaf gaggeessuu waan barbaadaniif ragaa funaanuun dhufe. Ati qorannoo kanaaf hirmaattota filataman keessaa tokkoodha. Gaaffiiwwan ani si gaafadhu kun daqiiqaa soddoma fudhachuu danda'a. Wanti aniif ati haasofnu hundiyyuu iccitiin isaa kan eegamee fi nama dhuunfaa biroottis ta'ee dhaabbata kamiifuu eeyyama kee malee hin dabarfamu. Qorannoo kanatti namni kan hirmaatu fedhiidhaan qofa ta'a. Qorannoo kanatti hirmaachuu fi hirmaachuu diduu murteesuu ni dandeessu. Yoo yaaada armaan olii kana irratti waliigalte gaaffiiwwan koo odeeffannoo waliigala maatii irraan eegala. Yoo fedha qabaattan qofa qorannoo kanaaf galtee ta'uu kan dandeessan. Qorannoo kana gaggeessuuf xalayaan qulqullinaa yinivasiitii Jimmaatti koree mirkaneessa qorannoo irraa naaf eeyyamameera. Qorannoo kana/adeemsa qorannichaa ilaalchisee gaaffii qabdan kamiyyuu teessoo asiin gaditti ibsameen qunnamuu ni dandeessu.

Teessoo qorataa: Obboo Dassaalee Leellisaa : Lakkoofsa Bilbilaa:+251912856799

Waan mari'anne irratti gaaffii qabdaa? Itti fufuu dandeenyaa?

Lakkii _____ (galateeffadhutii dhaabi)

Eeyyee _____ (galateeffadhuutii itti fufi)

Koodii waraqaa gaaffii_____

Aanaa_____Ganda_____Zoonii_____Itti gaafatamaa manaa _____

Maqaa to'ataa_____Maqaa nama daataa funaane_____Guyyaa

_____/_____/_____Guyyaa daataan funaaname_____/_____/_____Mallattoo_____Guyyaa

to'atame_____/_____/_____Mallattoo_____

Kutaa Tokkoffaa**Gaaffii Odeeffannoo Walii Galaa Abbaa Warraa>Nama Gaafatamuu Aanaa****Meettaa Roobii, Godina shawaa lixaa, Mootummaa Naannoo Oromiyaa, 2019**

T/Lakk	Gaaffilee	Deebii	Yaada
200.	Umurii abbaa warraa /nama gaafatamuu waggaa guutuun	_____	
201.	saala abbaa warraa/nama gaafatamuu	1. Dhiira 2. Dhalaa	
202.	Haala fuudhaaf Heerumaa abbaa warraa /nama gaafatamuu	1. Hin fuune/heerumne 2.Fuudheera/heerumteetti 3. Adda bahan 4.Irraa du'e/duute	
203.	Amantaa abbaa warraa /nama gaafatamuu	1. Ortodooksii 2. Protestaantii 3. Musliima 4.Waaqeffataa	
204.	Qomoo abbaa warraa /nama gaafatamuu	1.Oromoo 2.Amhaaraa 3.Tigiree 4. Guraagee 5. Sidaamaa	
205.	Gosa hojii abbaa warraa /nama gaafatamuu	1.Barataa/tuu 2.Qotee bulaa 3.Daldalaa/tuu 4. Hojjetaa/tuu mootummaa	

		5. Hojii hin qabu	
206.	Sadarkaa barumsaa abbaa warraa /nama gaafatamuu	1. Dubbisuu fi barreessuu kan hin dandeenye 2. Sadarkaa 1ffaa (kutaa1-8) 3.Sadarkaa 2ffaa(kutaa9-12) 4. Dippiloomaa 5. Digirii tokkffaa 6. Digirii lammaffaa	
207.	Galii ji'aa kan maatii qarshiidhaan	_____	
208.	Baay'ina maatii lakkoofsaan	_____	
209.	Ijoolleen waggaa sagalii fi isaa gadii maatii keessan keessaa jiruu/aa/tii?	1. Eeyyee 2. Lakki	
210.	Yoo gaaffiin 209 Eeyyee ta'e baay'inni ijoollee waggaa sagalii fi isaa gadii maatii keessan keessaa meeqa?	_____	
211.	Hariiroon ati ijoollee kana waliin qabdu maali?	4. Abbaa 5. Haadha 6. Eegduu	
212.	Waa'ee dhibee Tiraakoomaa dhageessee beektaa ?	1. Eeyyee 2. Lakki	
213.	Yoo gaaffiin 212 eeyyee ta'e, waa'ee dhukkuba Tiraakoomaa eessaa dhageesse?	1 Tiivii irraa 2 Raadiyoo irraa 3 poostera irraa 4 ogeessa fayyaa irraa 5 Kan biroo(ibsi)	

214.	Amallii fi mallattooleen ati kun dhukkuba Tiraakoomaati si jechisiisu maali?	<ol style="list-style-type: none"> 1. Diimachuu ijaa 2. Miira waraansaa keessoo ijaa 3. Hooksisuu, dhiita'uu ijaa fi wanta akka bishaanii ija keessaa yaa'uu 4. Iji ciimmaa yaasuu 5. yeroo ifi gahaa hin jirre hubachuu dadhabuu darker 6. Hin beeku 	
215.	Tiraakoomaan dhukkuba daddarbudhaa?	<ol style="list-style-type: none"> 1. Eeyyee 2. Lakki 	
216.	Yoo deebiin gaaffii 215ffaa eeyyee ta'e akkamitti daddarba?	<ol style="list-style-type: none"> 6. Ija dhukubichaan dhukkubsate tuttuquun 7. Uffata, fookaa fi boraatii faalame tuttuquun. 8. Tisiisa bobbaa irratti wal horteen 9. Qilleensaan 10. Kan biroo (ibsi) 	
217.	Dhukkubni Tiraakoomaa dhukkuba ittisamudhaa?	<ol style="list-style-type: none"> 1. Eeyyee 2. Lakki 	
218.	Yoo deebiin gaaffii 217ffaa eeyyee ta'e akkamitti ittifama?	<ol style="list-style-type: none"> 5. Yaalii baqaqsuun 6. Daawwaan 7. Qulqullina fuulaa eegachuun 8. Qulqullina naannoo eegachuun 	
219.	Harka keen i dhiqattaa?	<ol style="list-style-type: none"> 1. Eeyyee 2. Lakki 	
220.	Yoo deebiin gaaffii 219ffaa eeyyee yoomfaa dhiqatta?	<ol style="list-style-type: none"> 1. Nyaata qopheessuun dura 2. Nyaata nyaachuun dura 3. Nyaataan booda 3. Ijoollee chaacchisuun dura, 4. Daa'ima qulqulleessuun booda 5. Mana fincaanii fayyadamuun booda 	

Kutaa lammaffaa

Gaaffii odeeffannoo waliigalaa ijoollee qorannoof filatamtee a jiraataa baadiyyaa Aanaa Meettaa Roobii, Godina shawaa lixaa, Mootummaa Naannoo Oromiyaa, 2019

221.	Umurii ijoollee waggaa guutuun	_____	
222.	Saala ijoollee	1. Dhiira 2. Dhalaa	
223.	Amantii Ijoollee	1. Ortodooksii 2. Protestaantii 3. Musliima 4. Waaqeffataa	
224.	Qomoo	1. Oromoo 2. Amhaaraa 3. Tigiree 4. Guraagee 5. Sidaamaa	
225.	Sadarkaa barumsaa ijoollee	1. Dubbisuu fi barreessuu kan hin dandeenye. 2. KG-1ffaa 3. KG -2ffaa 4. KG-3ffaa 5. Sadarkaa 1ffaa Marsaa1ffaa (kutaa 1-4ffaa)	

Kutaa sadaffaa:**Haalawaliigala mana baadiyyaa Aanaa meettaa Roobii, Godina shawaa lixaa,
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226.	Baay'ina kutaa manichi qabu	_____	
227.	Iddoo nyaanni itti bilcheeffamu	1. Kutaa addaa 2. Kutaa jireenyaa	
228.	Madda anniisaa nyaata bilcheessuuf fayyadaman	1. Muka qoraanii 2. Cilee	
229.	Kutaa itti nyaanni bilcheeffamu foddaa qabaa?	1. Eeyyee 2. Lakki	
230.	Akkamitti akka kosii dhangala'oo maksan beektaa?	1. Eeyyee 2. Lakki	
231.	Yoo deebiin gaaffii 230ffaa eeyyee ta'e malootni ittiin maqsitan maalfaadha? (Ilaali)	1. Boolla 2. Dirree irratti 3. Mooraa keessatti 4. Sirna ammayyaa diriiretti	
232.	Akkamitti akka kosii jajjaboo maksan beektaa?	1. Eeyyee 2. Lakki	
233.	Yoo deebiin gaaffii 232ffaa eeyyee ta'e malootni ittiin maqsitan maalfaadha? (Ilaali))	1. Dirree irratti 2. Mooraa keessatti 3. Awwaaluun 4. Bakka eeyyamametti gatuu 5. Gubuu 6. Kan biro(ibsi)	
234.	Bakki walhormaata tisiisaaf mijatu jiraa(ilaali)	1. Eeyyee 2. Lakki	
235.	Yoo deebiin gaaffii 234ffaa eeyyee ta'e bakka tisiisni itti wal hortu(ilaali)	1. Faltii loonii 2. Mana fincaanii banaa 3. Wantoota tortorarii fi haftee nyaataa gatame	

236.	Loon manaa qabduu?	1. Eeyyee 2. Lakki	
237.	Yoo deebiin gaaffii 236ffaa eeyyee ta'e bakka loon manaa itti galan(ilaali)	1. Mooraa addaatti looniif ijaarame 2. Mana namni itti galu keessa	

Kutaa Afraffaa

Haala waliigala qulqullina dhuunfaa Qoratamaa jiraataa baadiyyaa Aanaa Meettaa Roobii, Godina shawaa lixaa, Mootummaa Naannoo Oromiyaa, 2019

238.	Waa'ee dhukkuba Tiraakoomaa odeeffannoo isaa/dhageessee beektaa?	1. Eeyyee 2. Lakki	
239.	Harka kee ni dhiqattaa?	1. Eeyyee 2. Lakki	
240.	Yoo deebiin gaaffii 239ffaa eeyyee ta'e yeroo kam dhiqatta?	1. Nyaata dura 2. Nyaata Booda 3. Mana fincaanii booda	
241.	Fuula kee ni dhiqattaa?	1. Eeyyee 2. Lakki	
242.	Yoo deebiin gaaffii 241ffaa eeyyee ta'e guyyaatti yeroo meeqa dhiqatta?	1. Yeroo lamaa fi isaa ol 2. Yeroo tokko qofa 3. Hin dhiqadhu	
243.	Yeroo fuula kee dhiqattu saamunaa ni fayyadamtaa?	1. Eeyyee 2. Lakki	
244.	Yoo deebiin gaaffii 243ffaa eeyyee ta'e yeroo meeqa saamunaan dhiqatta?	1. Yeroo hundaa 2. Yeroo tokko tokko	
245.	Ciimmaan fuula qoratamaa irra jiraa?	1 Eeyyee 2. Lakki	
246.	Tisiisni fuula qoratamaa irra jiraa?	1. Eeyyee 2. Lakki	

Kutaa Shanaffaa

Haala waliigala WASH fi qulqullina naannoo dhuunfaa Qoratamaa Aanaa Meettaa Roobii, Godina shawaa lixaa, Mootummaa Naannoo Oromiyaa, 2019

247.	Manni fincaanii jiraa?(ilaali)	1. Eeyyee 2. Lakki	
248.	Yoo deebiin gaaffii 247ffaa eeyyee ta'e, gosa mana fincaanii	3 Mana fincaanii uwwisa qabu 4 Mana fincaanii uwwisa hin qabne	
249.	Mana fincaanii itti fayyadamaa jiruu(ilaali)	1. Eeyyee 2. Lakki	
250.	Yoo deebiin gaaffii 249ffaa eeyyee ta'e, Miseensa maatii keessaa eenyutu mana fincaanii fayyadama?	1. Ga'eessota qofaa 2. Ga'eessotaa fi ijoollee	
251.	Haala itti fayyadama mana fincaanii	1. Yeroo hunda 2. Yeroo tokko tokko	
252.	Fageenya mana fincaanii fi mana jireenyaa gidduu jiru meetiraan	_____	
253.	Madda bishaanii(ilaali)	1. Boonoo 2.Bishaan boollaa eegumsa qabu 3.Bishaan burqaa eegumsa qabu 4. Bishaan burqaa eegumsa hin qabne 5.Bishaan boollaa eegumsa hin qabne	
254.	Itti fayyadama bishaanii miseensa maatiif liitiraan guyyaatti meeqa?	_____	
255.	Giddu galeessaan yeroo bishaan itti fayyadama manaatiif fiduuf fudhatu daqiiqaadhaan	_____	

Kutaa jahaffaa

waliigala faca'insa dhukkuba Tiraakoomaa ijoollee jiraattota baadiyyaa Aanaa Meettaa Roobii, Godina shawaa lixaa, Mootummaa Naannoo Oromiyaa, 2019

256.	Firii qorannoo dhukkuba tiraakoomaa	1. Poosiitivii 2. Negaatiivii	
257.	Yoo deebiin gaaffii 256 poosiitivii ta'e Tiraakoomaa gosa kamiiti?	1. Tirakoomatus inflammation follicular(TF) 2. Tiraakoomatus inflammation intense(TI)	
258.	Saala ijoollee dhukkubni Tiraakoomaa keessatti argamee	1. Dhiira 2. Dhaalaa	
259.	Umuruu ijoollee dhukkubni Tiraakoomaa keessatti argame waggaa guutuun	_____	