



## Awareness of Trachoma Prevention among People of Bolori Community Maiduguri Metropolitan Council Local Government Area of Borno State, Nigeria.

Yafanna, G. A.,<sup>1</sup> Musa, D.,<sup>2</sup> Abubakar, N. S<sup>1</sup>.,  
Abubakar, H<sup>1</sup>., Kode, S<sup>1</sup>., & Alhassan, M. B.<sup>3</sup>

<sup>1</sup> School of Post Basic Ophthalmic Nursing National Eye Center Kaduna.

<sup>2</sup> Department of Community Ophthalmology, Research and Data Management Unit, National Eye Center Kaduna.

<sup>3</sup> Department of Vitreoretinal National Eye Center Kaduna.

*Corresponding Author: Dr. Musa Danjuma*

*Corresponding Email: musakaus78@gmail.com*

### Abstract

**Background:** Trachoma is the leading infectious cause of blindness in the world. It is commonly found among cultural groups with poor hygiene. Its controls include; Surgery, Antibiotics, Facial cleanliness and Environmental Sanitation (SAFE). Potentially blinding and active trachoma are monitored using trachomatous trichiasis (TT) in adults and trachoma inflammation-follicular (TF) in children aged 1–9 years respectively. A community-based cross-sectional study was conducted to assess the awareness of trachoma preventive measures among the people of Bolori, in the metropolitan council of Maiduguri Borno State, Nigeria. **Methods:** The study utilizes a descriptive research design and a multi-stage sampling technique, which involve both stratified random and convenient sampling methods respectively. The instruments comprise a closed-ended questions and sections A and B. Section A: focus mainly on sociodemographic data while section B; focuses on the research question. The researcher initially divided Bolori wards into 7 strata of which a convenient sample technique was used to administer 53 questionnaires to 3 strata and 54 questionnaires to 4 strata, each daily which lasted 7 days. **Results:** The majority of the respondents are aware of trachoma preventive measures. The majority (34.8%) of the respondents are between the ages of 26 – 35 years, 37 (32.2%) of the respondents are between the ages of 36 – 45 years, 20 (17.4%) of the respondents are within the age range of 15 – 25 years, and 46 years and above are 18 (15.6%) of the respondents. The Grand Total Mean for Knowledge of respondents was 57.4%, causes and prevention 76.7%, the attitude of the people towards personal and environmental sanitation 76.8%, and SAFE strategy prevention is 51.5%. **Conclusion:** Based on the data obtained from the research study, findings revealed that the majority of the respondents have a good awareness of Trachoma prevention, especially on a good attitude toward environmental sanitation. Findings also revealed that there was low access to clean and adequate water supply among the populace of the community.

**Keywords:** *Trachoma, SAFE, TT, TF, Bolori, Maiduguri, Nigeria.*

DOI: <https://dx.doi.org/10.4314/bjnhc.v4i1.4>

### Introduction

Trachoma is a neglected tropical disease and the leading infectious cause of blindness worldwide. It is caused by an obligate intracellular bacterium called chlamydia trachomatis. The infection leads to scarring of the inner surface of the eyelids and erosion of the corneal surface, which eventually leads to

blindness. (Adepoju, ., 2014.), while the causative bacteria are transmitted via direct or indirect contact, contact with the affected person's eye or nose are the main ways the infection is spread. Closed living spaces and poor sanitation increase the spread of the disease. (Ahmad & Patel. 2021)

Globally, about 232 million people live in trachoma-endemic areas and need treatment. An estimated 7.2 million people have trichomatous trichiasis. (WHO, 2015)

it's a disease of poverty, regardless of geographical region. Cicatricial trachoma is prevalent in large regions of Africa, the Middle East, Asia, and Aboriginal communities in Australia, and there are also small foci in Central and South America. (Smith. *et. al.*, 2015)

According to (Ahmad,2022), bacteria are transmitted via direct or indirect contact. Contact with the affected person's eye or nose is the main ways the infection is spread. Closed living spaces and poor sanitation increase the spread of the disease. Trachoma is a disease of poverty, overcrowding, and poor sanitation. The active disease mainly affects children, but adults, particularly women, are at increased risk of scarring. (Lansingh, 2016)

The SAFE strategy is a set of four interventions recommended by WHO in order to eliminate blinding trachoma as a public health problem. Each letter of the word SAFE represents part of the strategy as follows: Surgery (for trichiasis); Antibiotics; Facial cleanliness; Environmental improvement. (WHO,2015). One study demonstrated a strong association between trichomatous trichiasis and relative poverty, lending further evidence that general improvements and successful implementation of the SAFE strategy might improve both the health and wealth of individuals and communities. (Habtamu, *et.al.*, 2015). Corneal damage from trachoma is caused by multiple processes. Scarring trachoma damages glandular structures and may cause an inadequate tear film; a dry eye may be more susceptible to damage from in-turned lashes and superadded infection by other bacteria and fungi, leading to corneal opacification. (Lansingh, 2016). Also, trachoma infection is transmitted by direct people or indirect transfers of eye and nose discharges of infected people, particularly young children who harbor the

principal reservoir of infection. This discharge can be spread by particular species of flies. (Khurana, 2014).

### **Background to the Study**

Globally, about 232 million people live in trachoma-endemic areas and need treatment. An estimated 7.2 million people have trichomatous trichiasis. (WHO,2015). Also, according to the world health organization (WHO), vision (2020) resources trachoma is the world leading cause of preventable blindness, and the third (3<sup>rd</sup>) leading cause of preventable blindness globally which is endemic in 55 countries of; Africa, Asia, Central, and South America. (Khurana 2014).

Borno State located in the northeast Nigeria, is the region with the highest burden of blindness in the country. The research done by the global trachoma mopping project in Borno State in the year 2013 – 2014 result shown that 10 local government areas that are endemic had trachoma follicles (TF) prevalence of between 5% and 9.9%. No local government had (TF) prevalence >10%. Trachoma trichiasis (TF) prevalence ranged between 0.1% in the Bolori community area and the prevalence in Bolori is 3.3% in the Bolori community area. (Mahammed, *et. al.*, 2016 and Rabi, *et. al.*, 2011).

Trachoma is highly correlated with poverty, limited access to health care services and poor water supply, lack of personal and community hygiene and it affects when 3metres more than probably as a result of their prolonged contact with infected children. (Silvio and Rosalina 2010).

As a contagious bacterial infection that affects the conjunctiva covering of the eye, the cornea, and the eyelids, trachoma is controlled by an endorsed integrated strategy consisting of surgery for trichiasis, antibiotic therapy, facial cleanliness, and environmental improvement, namely, the SAFE strategy developed by World Health Organization. (Tian, *et.al.*, 2018, WHO,1998)

Based on evidence from previous field trials and constantly modified in practice, the SAFE strategy has greatly boosted the progress in trachoma control. Regardless of the fact that there are still many pending questions, national program coordinators are convinced that the trachoma control initiative based on the SAFE strategy would be effective (Tian, *et.al.*, 2018)

### **The attitude of the Community towards Personal and Environmental Sanitation**

Access to safe water, sanitation, and hygiene (WASH) facilities is a basic necessity for human livelihood, survival, and well-being. Adequate WASH facilities provision is a critical issue in most developing countries around the world including Nigeria. (Sridhar, *et.al.* 2020)

In 2019, globally, the number of people at risk of trachoma was 142.2 million and it is responsible for the visual impairment of about 1.9 million people. (WHO, 2019).

However, 2.3 billion and 844 million people across the globe lack access to basic drinking water and sanitation facilities, respectively (WHO, 2017).

Several factors are associated with an increased risk of trachoma. These include lack of water, poor personal hygiene, and environmental sanitation (Altherr, *et., al.*, 2019). Furthermore, poor knowledge (Munguti, *et.al.*, 2015 and unfavorable sociocultural perceptions, and poor practices about the prevention of trachoma are the main factors in the transmission and sustaining of the infection of trachoma in the communities (WHO, 2017).

Recently there has been a shift away from the provision of sanitation infrastructures toward approaches that serve people's motivation to improve their own sanitation. Some of these approaches developed in some communities contribute most to the success of sanitation and are as follows:

1. Community leads total sanitation- It refers to ways of igniting community interest in ending open defecation, usually by building simple toilets such as pit latrines. It involves actions leading to increased self-respect and pride in one's community. (Smith, *et. al.*, 2013.)
2. Community health club: Experience has shown that community clubs are effectively made for changing knowledge, attitude, and practices on environmental health issues. Sanitation and hygiene behavior can be starting points for all members of community health clubs. When mutual support will help to achieve output. (WHO, 2020).

### **Level of implementation of strategy in the eradication of trachoma in the community**

Trachoma affects the most marginalized and also in 1998, the world health assembly passed a resolution calling for the global elimination of blinding trachoma by the year 2020. WHO and the international agency for the prevention of blindness, launched the global alliance for the elimination of blinding trachoma by 2020 (WHO 2020) the alliance aims to eliminate blindness caused by trachoma not to eradicate trachoma or trachoma infection. (Emerson, 2010) The strategy for trachoma control promoted by all these organizations is the integrated strategy known as SAFE: this strategy aims both to treat and prevent diseases. (Lansingh 2016)

### **Methodology**

#### **Research Design**

The research design used for this study was a non-experimental design specifically the cross-sectional descriptive survey, in which the researcher collects data from a large sample drawn from a given population and describes certain features of the sample as they are without manipulating any independent variables of the study. According to Rylander (2012), descriptive surveys help

to identify and describe specific phenomena and to identify relationships and differences among variables in a study

n = 11804/31.51  
n = 374.61  
**n Approx. 375**

**Research Setting**

The study area was the Bolori community in Maiduguri metropolitan council, Maiduguri Local Government is in the Northern part of the state, having boundaries with the Konduga Local Government area and Jere Local Government area people occupying this area are Kanuri, Shuwa, Hausa, Fulani, and visitors that come to settle there from different states, the occupations of the resident people are mainly farming, cattle rearing and trading. Visitors that came to settle there are civil servants and traders. Also, some of them produce agricultural products which includes peanuts (groundnut), sorghum, millet, maize, rice, cotton wool, fishing, cattle, goats, cows, sheep, and horses. Bolori, in the Maiduguri Metropolitan council, in Borno State, Nigeria. Bolori is on Latitude: **11° 51' 40" N** and Longitude: **13° 7' 44" E**. The Maiduguri metropolitan estimated population in 2022 is 822,000, an increase of 2.37% from 2021. The current population of Bolori ward 11 is 10804.

**Target Population**

The target population for this study was 11804 inhabitants of Bolori –sub ward 11, who are above the age of 18 and meet up the inclusive criteria. (Anthony, 2019)

**Sample Size**

The sample size used was modified from Yamaene’s formula for calculating the sample size.

Since the target population for the study was 11,804, using Taro Yamane’s formula. Where;

$$N = \frac{N}{1 + N(e^2)}$$

Where n =sample size

N = target population

E =marginal error which is 0.05 n = N/1 + N(e<sup>2</sup>)

$$n = 11804/1 + 11804(0.05^2)$$

$$n = 11804/1 + 11804(0.0025)$$

$$n = 11804/1 + 29.51$$

**Validity of Instrument**

The instrument was vetted by the two senior lecturers versed in research in the Ahmadu Bello University Zaria (ABU), Department of Nursing Sciences including a consultant from the public Health department of the same institution. Others include clinical Nurses and senior post-basic nursing school educators in order, to ascertain the relevance of contents and clarity of statements.

**Reliability of the Instrument**

A pilot test was carried out in Jigawa state, which is a state with similarities to Borno state in terms of geopolitical location and endemism of trachoma diseases. The instrument was tested by administering the questionnaire to 10 respondents which represent 37% of the sample population) and the data generated was divided into even and odd items utilizing Pearson correlation (r) to establish reliability which was determined at 0.87 indicating that the instrument was reliable for utilization in the study.

**Ethical Considerations**

An administrative permit was obtained from the traditional ruler of the Bolori community. Respondent consents were obtained and confidentiality of collected data was assured and respondents were free to withdraw from the study at any time without consequences.

**Procedure for Data Collection**

Prior to data collection, initial visits were made to; the traditional ruler of the Bolori ward 11 community. These visits provided the forum for introduction and for establishing rapport between the research team, the village head, and the community members The four research assistants that were recruited had obtained the national certificate of education/national diploma. The researcher provided guidance on how to carry out the survey and how to maintain good interpersonal relationships. The purpose of carrying out the survey was clearly explained.

The subjects were approached by the researcher or his assistants, and informed consent was obtained for inclusion in the study. Those who gave consent to participate in the study and who could read and write were given one questionnaire to complete. Those who could not read and write were helped by the researcher or his assistants to complete the questionnaire. 7 days was used in the administration of the questionnaire. An average of 54 for 4 days and 53 for 3 days, consenting participants were reached for 7

days and administered with the questionnaires based on first seen, first served until the required sampled size was obtained.

**An instrument for Data Collection**

The instrument used by the researcher was 375 self-structured closed-ended questionnaires which were divided into two sections. Section A and B respectively. Section A focused mainly on socio-demographic data while section B focused specifically based on the research question

**Results**

**Table 1:** Age Distribution of the respondents

n= 375

<b>Age of the Respondents</b>		
<b>Variable</b>	<b>Frequency</b>	<b>Percentage (%)</b>
15 – 25	65	17.4
26 – 35	131	34.8
36 – 45	121	32.2
46 and above	58	15.6
<b>Gender</b>		
Male	209	55.7
Female	166	44.3
<b>Tribe</b>		
Hausa	124	33
Kanuri	135	36
Babur	26	7
Chibok	90	24
<b>Occupation</b>		
Civil servant	144	38.3
Housewife	90	24
Student	105	28
Business	36	9.7

**Table 1:** Shows 131 (34.8%) that of the respondents are between the ages of 26 – 35 years, 121 (32.2%) of the respondents are between the age of 36 – 45 years, 65 (17.4%) of the respondents are within the age range of 15 – 25 years, and 46 years and above are 58 (15.6%) of the respondents.

The above table shows the gender distribution of the respondent which shows 166 (44.3%)

of the respondents are male while 209 (55.7%) of the respondents are female.

The above table shows the tribe distribution with Kanuri having the highest percentage of 135 (36%), followed by Hausa 124 (33.0%), Chibok 90 (24%), and Babur 26 (7%). The above table shows that 144 (38.3%) were civil servants, 105 (28%) were students, 90 (24%) were housewife and 36 (9.7%) were doing business.

**Table 2: Trachoma awareness among the respondents**

SN	Variable	Yes	%	No	%
1.	Trachoma is a specific type of clinic conjunctivitis caused by chlamydia trachomatis?	215	57.4	160	42.6
2.	Have you ever seen trachoma?	183	48.7	192	51.3
3.	Do you believe trachoma can lead to blindness?	222	59.1	153	40.9
4.	Trachoma is contagious?	241	64.3	134	35.7
<b>Grand Total Mean</b>		<b>215</b>	<b>57.4</b>	<b>160</b>	<b>42.6</b>

The table above shows that the respondents know about Trachoma with a grand total mean of “Yes” 215 representing 57.4% and “No” 160 representing 42.6% of the grand total mean of respondents.

**Table 3: Trachoma prevention and control among the respondents**

S/N	Variable	Yes	%	No	%
1	Lack of sanitation and poor hygiene causes trachoma	316	84.3	59	15.7
2	Lack of adequate water supply causes trachoma	277	73.9	98	26.1
3	Proper refuse disposal prevents trachoma	290	75.7	85	22.6
4	Regular face washing prevents trachoma	275	73.4	100	26.6
<b>Grand Total Mean</b>		<b>288</b>	<b>76.7</b>	<b>87</b>	<b>23.3</b>

The table above shows the respondent’s current level of awareness of the cause and prevention of trachoma with a grand total of “yes” 288 representing 76.7% and “No” 87 representing 23.3% of the grand total mean of respondents.

**Table 4: Attitude towards trachoma prevention and control sanitation.**

SN	Variable	Yes	%	No	%
1.	Do you regularly wash your face?	316	89.3	59	15.7
2.	Do you dispose of your refuse properly after collection?	277	73.9	98	26.1
3.	Do your children practice open defecation?	285	75.7	90	24.3
4.	Do you regularly clean your environment?	274	73.1	101	26.9
<b>Grand Total Mean</b>		<b>289</b>	<b>76.8</b>	<b>86</b>	<b>23.2</b>

The table above shows the respondent attitude toward personal and environmental sanitation with a grand total of “Yes” 289 respondents representing 76.8% and “No” 86 representing 23.2% of the total grand mean of respondents.

**Table 5: The level of implementation of Trachoma SAFE strategies.**

SN	Variable	Yes	%	No	%
1.	Is trachoma surgery suffered in your community?	156	41.7	219	58.3
2.	Is these drugs azithromycin that was distributed in your community?	167	44.4	208	55.7
3.	Have you been encouraged to regularly washing your face in the community?	231	61.7	144	38.3
4.	Do you properly dispose your refuse in your community?	219	58.3	167	41.7
<b>Grand Total Mean</b>		<b>193</b>	<b>51.5</b>	<b>182</b>	<b>48.5</b>

The table above shows the respondent’s current level of implementation of safe strategy in the prevention and eradication of trachoma in the community with a grand total of “Yes” 193 respondents representing 51.5% and “No” 182 representing 48.5% of the grand total mean.

## Discussion

The study assessed awareness of Trachoma prevention among the Bolori community in the Maiduguri metropolis council area of Borno State, Nigeria. Having received some level of education on trachoma and its prevention and control, hence a good number of the participants were aware of the good practices for the prevention and control of the disease.

In this survey, 88.3% were aware of the preventive measures for trachoma. This is in line with the findings of Gabriel 2005. This shows that there is awareness on Trachoma as a public health problem in a survey conducted to find out the level of trachoma awareness in Northern Tanzania. This may be related to the global efforts of trachoma eradication in Africa, which of course proper awareness campaigns were established but no proper implementation of prevention strategies in Africa hence the disease remains a menace in Africa. The majority of the respondents were also aware that trachoma is an eye infection that is transmitted by flies due to poor hygiene and sanitation. The findings are in line with the study outcome of; (Njomo, *et.al.*, 2016) On knowledge, practices, and perceptions of trachoma and its control among communities of Narok County, Kenya. Who opined that; Majority of the community members knew trachoma and its transmission. The practices that contributed to the transmission of infection included: failure to wash faces and bathe regularly, sharing of water basins and towels for face washing, traditional methods of trachoma treatment, and a dirty household environment. The study finding was in opposition to the study outcome of (Mtuy, *et. al.*, 2019) on Knowledge, perceptions and experiences of trachoma among Maasai in Tanzania: Implications for prevention and control, which state that; There was awareness of trachoma and basic symptoms. Yet an understanding of etiology and prevention was poor. Trachoma was attributed to pollen, dust, and smoke. Water was recognized as

beneficial but seen as treatment and not prevention.

The result analysis shows that respondents believe that lack of sanitation, hygiene, and water supply causes Trachoma. Proper refuse disposal and regular face washing prevent Trachoma. This is in line with the study of; Mara Land Lane, (2015). Trachoma is highly correlated with poverty and limited access to health services. (Emerson, *et. al.*, 2006 and C., C. 2009). The results also indicate that the community members are aware that observing personal hygiene, as well as environmental sanitation, are key factor in the prevention of trachoma infection.

The result analysis shows that the attitude of people of the Bolori community towards personal and environmental sanitation is good. This is in line with the study of (Brechtner, *et. al.*, 2019), that recently there has been a shift away from the provision of sanitary infrastructure towards approaches that creates motivation to improve their own sanitation through organization and development of community organization that aim at changing sanitation and hygiene attitude and behavior of community through communal activities. (Silvio and Rosalina 2010.)

The result analysis also shows that there is Trachoma surgery offered in the community and there is no drug (azithromycin) that was administered to the them. This reveals that there is an encouragement to regular washing of their faces and disposal of their refused property in the community in accordance to the above study finding, this is in line with the findings, of a study by (Anthony, 2011) which showed that good water supply would improve washing habits of faces and also prevent the spread of Trachoma in the community.

## Implications of Findings to Nursing

The role of the ophthalmic nurse in the control of Trachoma spread is a paramount organization of the school's health services at

various levels will help in educating school children and staff on the importance of personal hygiene and environmental sanitation as well as proper eye care. Also, creation of community mobilization in collaboration with community teachers and other health care practitioners to create awareness and change the community attitude towards personal and environmental hygiene which are great factors in the spread of Trachoma and other endemic diseases. (Hagi, *et al.*, 2010).

### Conclusion

In conclusion based on the data obtained from the research work many people are aware of the prevention of Trachoma, and exhibited good attitude toward environmental sanitation. It also shows that there is low access to clean and adequate water supply among the majority of the community members.

### Recommendations

Based on the finding of the study, the following recommendation is made:

- ✧ Adequate health education and enlighten on those factors that lead to disease spread in the community by health care workers and influential persons in the area.
- ✧ Creations of additional awareness through community, organisation for sanitation activities in other to put more effort to participate fully in the exercise.
- ✧ Government should make more efforts to improve good and adequate water supply to all parts of the community.
- ✧ Government should put more enlightened and increase awareness among community members whenever there are any eye care activities in the community.

### Conflict of interest

There are no conflicts of interest among the authors.

### References

Adepoju, F., Pam, R., & Owoeye. A. (2014), Clinical Text Book of Ophthalmology, (2<sup>nd</sup> Edition) Power print limited Kwara state

Ayalew T. Prevalence of trachoma and associated factors of children aged 1-9 Years in community-led total sanitation and hygiene triggered village and none triggered in girar jarso woreda, north shoa, oromia, Ethiopia. IJIR. 2016;2(9):1444–1455. [Google Scholar]

Anthony, A. (2019) final report of the smart-nutrition and retrospective mortality survey in Bolori ii, maiduguri metropolitan council (mmc), borno state, nigeria in favour of première urgence internationale (pui). december 2019 report number: 004: research gate

Altherr F. M., Nute A. W., Zerihun M., et al. Associations between water, sanitation and hygiene (wash) and trachoma clustering at aggregate spatial scales, amhara, Ethiopia. Parasites and Vectors. 2019;12:p. 540.

doi: 10.1186/s13071-019-3790-3. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Ahmad, B., & Patel, B. C. (2018) Trachoma [Updated 2022 May 1]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559035/>

Anthony, W. (2011), chlamydia trachomatis, may 11, 2011 from <ahref='https://www.macrotrends.net/cities/22008/maiduguri/population'> Maiduguri, asp?2011/18/2/115/80699. Available at <http://www.who.int/blindness/publications/get2020/en/> (last accessed 10

Ahmad B, Patel BC. Trachoma. [Updated 2022 May 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559035/>

Bobo, L., Munoz, B., Viscidi, R., Quinn, T., Mkocho, H., & West, S. (1991). Diagnosis of Chlamydia trachomatis



- eye infection in Tanzania by polymerase chain reaction/enzyme immunoassay. *Lancet* (London, England), 338(8771), 847–850. [https://doi.org/10.1016/0140-6736\(91\)91502-1](https://doi.org/10.1016/0140-6736(91)91502-1)
- Brechner, R. J., West, S., & Lynch, M. (1992). Trachoma and flies. Individual vs environmental risk factors. *Archives of ophthalmology* (Chicago, Ill.: 1960), 110(5), 687–689. <https://doi.org/10.1001/archophth.1992.01080170109035> December 2015) Google Scholar.
- Emerson, J., and Johnson, H. (2010), WHO bulletin health research findings org. (HRF 2010).
- Emerson, P.M., Lindsay, S.W., & Alexander, N. (2004) Role of flies and provision of latrines in trachoma control: cluster-randomized controlled trial. *Lancet* 2004;363:1093–1098. [PubMed] [Google Scholar] environmental improvement,” vol. 44, 2006, <https://www.cartercenter.org/documents/2302>. View at: Google Scholar
- Gabriel, T. (2005), international coalition for trachoma control (ICT) community eye health Journal vol. 28 issue 92
- Habtamu, E., Wondie.T., & Aweke. S (2015) Trachoma and relative poverty: a case-control study. *PLoS Negl Trop Dis* 2015;9:e0004228. [PMC free article] [PubMed] [Google Scholar].
- Hagi.M., Schemann. J. F., Mauny.F., Momo.G., & Sacko .D.(2010) Active trachoma among children in Mali: Clustering and environmental risk factors. *PLoS Negl Trop Dis*. 2010;4(1):e583.
- Health Journal vol. 32/number /05/2019. World Health Organization. Report of the 2nd global scientific meeting on trachoma. August 2003. international limited. Lansingh V. C. (2016). Trachoma. *BMJ clinical evidence*, 2016, 0706.
- Khurana, A. K (2014), comprehensive ophthalmology, (7<sup>th</sup> edition) New Delhi India new age Mara, L. L. C., & Scott, L. (2015) trachoma as a tropical disease *Journal plus. Org.* (HTML) J. plus org.
- Lansingh V. C. (2016). Trachoma. *BMJ clinical evidence*, 2016, 0706.
- Mohammed, D., Adamu, C. Mpyet, N. M., Murtala, M.U., Habila, M., Francisca O., Sunday, I., Uwazoeke, O., Usman A. B., Adamani W., Benjamin, C., Nwobi, R., Willis, R., Mann F., Alexandre, P., Brian, K. Chu., Nicholas, O., & Anthony, W. S. (2016) Global Trachoma Mapping Project (2016) Prevalence of Trachoma in Niger State, North Central Nigeria: Results of 25 Population-Based Prevalence Surveys Carried Out with the Global Trachoma Mapping Project, *Ophthalmic Epidemiology*, 23:sup1, 63-69, DOI: 10.1080/09286586.2016.1242757 Nigeria Metro Area Population 1950-2022</a>
- Mtuy, T. B., Burton, M. J., Mwingira, U., Ngondi, J. M., Seeley, J., & Lees, S. (2019). Knowledge, perceptions and experiences of trachoma among Maasai in Tanzania: Implications for prevention and control. *PLoS neglected tropical diseases*, 13(6), e0007508. <https://doi.org/10.1371/journal.pntd.0007508>
- Munguti P. N., Ng’ang’a L., Muttunga J. Knowledge, practices and perception on trachoma and its influence on health seeking behaviour of the pastoralist patients in kajiado central division, Kenya. *East and Central Africa Medical Journal*. 2015;2:89–96. [Google Scholar]
- Njomo, D. W., Karimurio, J., Odhiambo, G. O., Mukuria, M., Wanyama, E. B., Rono, H. K., & Gichangi, M. (2016). Knowledge, practices and perceptions of trachoma and its control among communities of Narok County, Kenya. *Tropical diseases, travel*

- medicine and vaccines*, 2, 13.  
<https://doi.org/10.1186/s40794-016-0029-6>.
- Rabiu, M. M., Muhammed, N., & Isiyaku, S. (2011) Challenges of trachoma control: an assessment of the situation in Northern Nigeria. *Middle east Afr J ophthalmology* (serial online).
- Rylander, D. (2012) Description of research activities  
[www.twu.edu/research/david-rylander.asp](http://www.twu.edu/research/david-rylander.asp)  
Institute of Health Sciences-Houston Center 6700 Fannin St, Houston, TX 77030(Google Map) 713.794.2000
- Silvio, P., & Rosalina's. S. (2010), *ophthalmic nursing* (4<sup>th</sup> edition) Swatan street Gabon South new-born Victoria, Australia.
- Smith, J. L., Flueckiger, R. M., & Hooper, P. J. (2013) The geographical distribution and burden of trachoma in Africa. *PLoS Negl Trop Dis* 2013;7: e2359. [PMC free article] [PubMed] [Google Scholar]
- Sridhar, M., Okareh, O. T., & Mustapha, M. (2020). Assessment of Knowledge, Attitudes, and Practices on Water, Sanitation, and Hygiene in Some Selected LGAs in Kaduna State, Northwestern Nigeria. *Journal of environmental and public health*, 2020, 6532512.  
<https://doi.org/10.1155/2020/6532512>
- Solomon, A. W., Pavluck, A. L., Courtright, P., Aboe, A., Adamu, L., Alemayehu, W., Alemu, M., Alexander, N. D., Kello, A. B., Bero, B., Brooker, S. J., Chu, B. K., Dejene, M., Emerson, P. M., Flueckiger, R. M., Gadisa, S., Gass, K., Gebre, T., Habtamu, Z., Harvey, E., & Foster, A. (2015). The Global Trachoma Mapping Project: Methodology of a 34-Country Population-Based Study. *Ophthalmic epidemiology*, 22(3), 214–225.  
<https://doi.org/10.3109/09286586.2015.1037401>
- The Carter Center, Women and Trachoma (2009): Achieving Gender Equity in the Implementation SAFE, The Carter Center, Atlanta, GA, USA, 2009.
- Trachoma atlas. Global atlas of trachoma. (2015). Available at <http://www.trachomaatlas.org/> (last trachoma control: a toolbox of interventions for promoting facial cleanliness and WHO (2017) WHO alliance for the global elimination of trachoma by 2020. *Community eye*.
- Tian, L., & Wang, N. L. (2018). Trachoma control: the SAFE strategy. *International journal of ophthalmology*, 11(12), 1887–1888.  
<https://doi.org/10.18240/ijo.2018.12.01>.
- WHO (2017) WHO alliance for the global elimination of trachoma by 2020. *Community eye health Journal* vol. 32/number /05/2019.
- WHO (2015) Report of the 2nd global scientific meeting on trachoma. August 2003. Available at <http://www.who.int/blindness/publications/get2020/en/> (last accessed 10 December 2015). [Google Scholar]
- World Health Assembly *Global elimination of blinding trachoma*. 51st World Health Assembly, Geneva, 16 May 1998, Resolution WHA51.11 Geneva: World Health Organization, 1998. [Google Scholar].
- WHO Progress on Drinking Water, Sanitation and Hygiene—2017 Update and SDG Baselines, Geneva, Switzerland: WHO Library Cataloguing-in-Publication Data; 2017, Launch version July 12 2017. [Google Scholar]
- WHO WHO alliance for the global elimination of trachoma by 2020. *Progress Report on Elimination of Trachoma*. 2019;(29):317–328. [Google Scholar]