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## Trachoma Intervention Framework : Systematic Literature Review

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### **Abstract:**

*Aim :This review surveys trachoma interventions and proposes a framework for trachoma intervention in rural areas.*

*Method:Trachoma prevention and control strategies published between January 2000 and December 2018 were identified using PubMed,PsycINFO,Embase,ERIC, Google, Google scholar and web of science. The following keywords were included in the search; trachoma prevention, trachoma control, disease control, intervention frameworks and rural areas. The search was conducted between 27<sup>th</sup>of January and 3<sup>th</sup> of February 2019*

*Results: 867 potentially relevant papers were identified, 678 papers were excluded because of duplicates leaving 189 papers. 170 papers were excluded because the titles were not relevant, 17 were removed because the abstracts were not relevant. Two papers satisfied our inclusion criteria and so they were picked for review.*

*Conclusion: The study identified different strategies that have been used for trachoma intervention and their weakness, it proposes a framework that can be adopted for trachoma intervention in rural areas. The results can be applied in trachoma intervention in rural areas and significantly improve rural communities livelihood.*

**Keywords:** Trachoma, intervention, prevention, control, framework

### **1.Introduction**

Trachoma is an irreversible blinding disease caused by a bacteria known as Chlamydia trachomatis, it occurs after recurrent, chronic infection. The infection can be caused by flies which have had contact with eyes or nose discharge of the sick person or through contact with the infected person(Buchan J.& Veema S., 2018).

Trachoma mostly affects preschool-aged children with infections rates reducing and becoming shorter with increasing age, its spread becomes much easier when living with infected people and therefore more common among family members, although it infects mostly young children eye sight problems becomes common in the ages between 30 and 40 years(Buchan J.& Veema S., 2018).Risk factors for trachoma transmission include crowded houses, water shortage, poor hygiene and inadequate sanitation facilities and latrines(WHO, 2019).

As of 2018 trachoma had infected 1.9 million people in 37 countries where it is most prevalent, it is the world's major cause of infectious blindness.(Njomo et.al, 2016).According to the world health organization (WHO),84 million people suffer from trachoma and majority are below 15 years of age(WHO, 2019).The disease is common in parts of Africa, India, south-east Asia, Central Asia, Middle East, Pacific region and Latin America, this wide spread and its dangerous consequences makes trachoma a major public health problem.

### **2. Methodology**

A systematic literature review was conducted on papers published between January 2000 and December 2018 using PubMed,PsycINFO,Embase,ERIC, Google, Google scholar and web of science. The following keywords were included in the search; trachoma prevention, trachoma control, disease control, intervention frameworks and rural areas. The search was conducted between 27<sup>th</sup>of January 1999 and 3<sup>th</sup> of February 2019,the twenty year period was found suitable because trachoma intervention have been there for long and therefore to find why those intervention have not been effective it was necessary to look at wide spectrum.

Books,book chapters, Journal articles,conference papers,non-academic papers were reviewed.

Using the reference list of the retrieved studies we got additional studies, we removed duplicates and screened abstracts and titles of the retrieved studies ,we then examined retrieved papers and selected the ones that met the inclusion criteria.From the literature survey we were able to get the key elements that we shall use to develop a framework for trachoma intervention in rural areas.

## 2.1. Study Selection Criteria

### 2.1.1. Inclusion Criteria

The inclusion criteria was researches with the following words in their title; trachoma prevention, trachoma control, disease control, intervention frameworks and rural areas. Publication done in english between January 2000 and December 2018 was the other inclusion criteria.

### 2.1.2. Exclusion Criteria

Researches that did not include the following words in their title were excluded; trachoma prevention, trachoma control, disease control, intervention frameworks and rural areas. Studies not done in English were excluded and studies done before January 2000 or after December 2018.

## 2.2. Data Extraction

The literature survey was conducted by a PhD student who didn't have assistants and therefore the extraction was done by a single person and a test-retest done from a random selection of the primary studies to check for consistency in the data extraction.

## 3. Results

Using PubMed, PsycINFO, Embase, ERIC, Google, Google scholar and web of science 867 potentially relevant papers were identified, 678 papers were excluded because of duplicates leaving 189 papers. 170 papers were excluded because the titles were not relevant, 17 were removed because the abstracts were not relevant. Two papers satisfied our inclusion criteria and so they were picked for review. Below is a Flow Diagram of the Study Selection Process

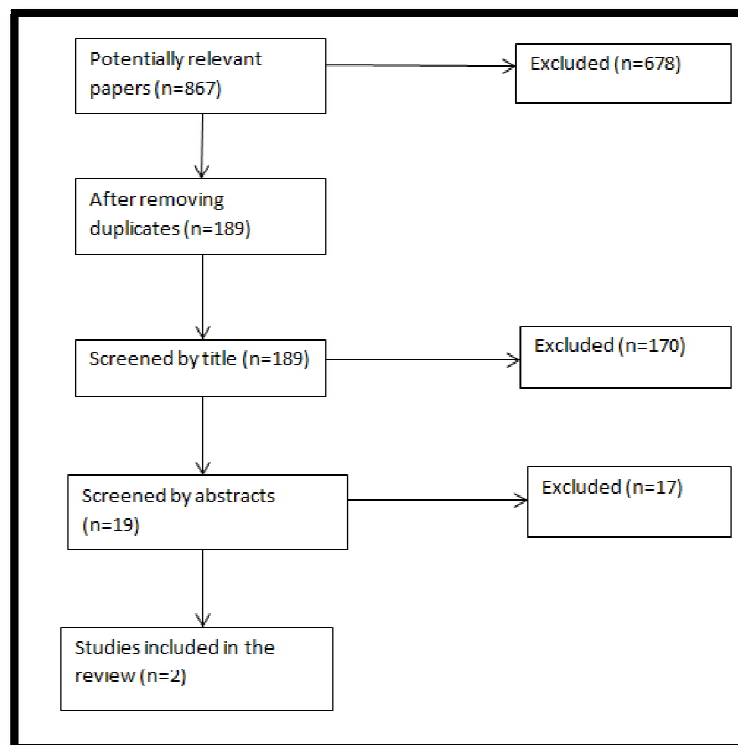


Figure 1: Flow Diagram of the Study Selection Process

Two publications met our inclusion criteria and we discuss them. The first publication selected was a book chapter on health belief model, it discusses the health belief model, its constructs, its applications and its limitations. It identifies the constructs of health belief model as demographic variables, psychological characteristics, perceived susceptibility, perceived severity, health motivation, perceived benefits, perceived barriers, actions and cues to actions. This publication was selected because it discusses why people decide to practice a certain health behaviour, this forms a general basis of adoption of a health behaviour and can lead to a community supporting a health behaviour or ignoring it.

The second publication is a report by world health organization which aims to eradicate trachoma in the world in the year 2020 through a framework known as SAFE (Surgery for trichiasis, Antibiotics to treat *C. trachomatis* infection, and Facial cleanliness and Environmental improvement to reduce transmission of *C. trachomatis* from one person to another). In this publication trachoma prevention and control are discussed, trachoma drug therapy, national health programs organization and administration and program evaluation and guidelines. This publication was selected because it discusses about trachoma prevention and control and can give us good basis for developing a trachoma intervention framework. Following is the discussion of two frameworks and their weaknesses

### 3.1. Health Belief Model (HBM)

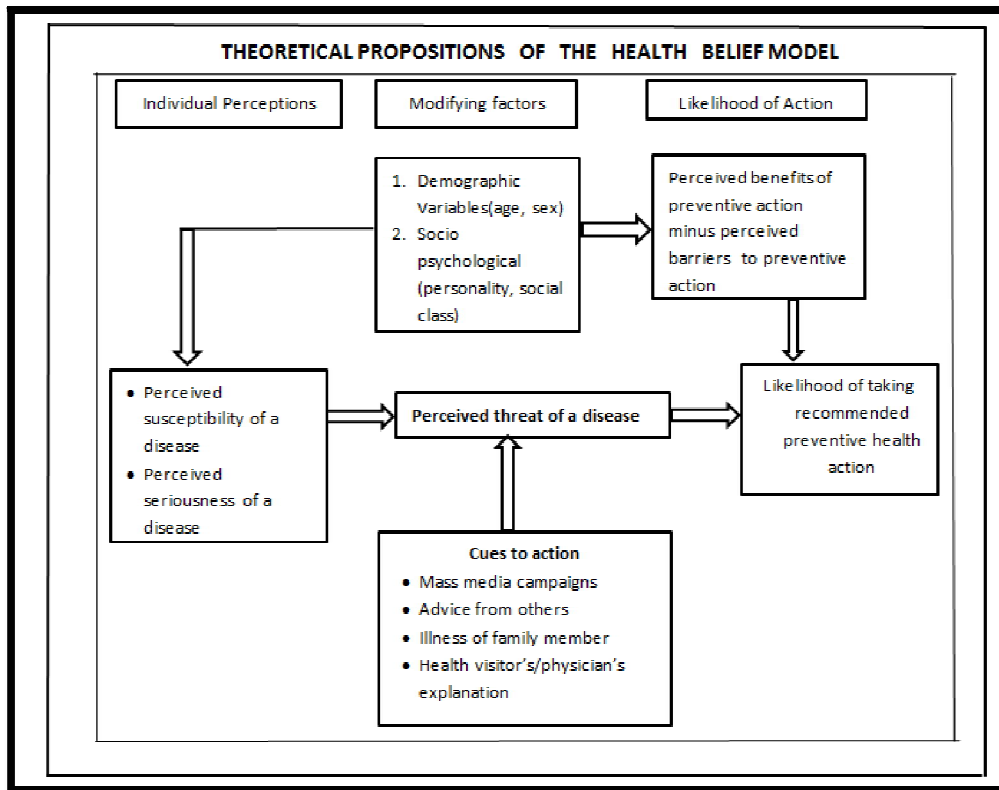


Figure 2: Health Belief Model (HBM)  
Source: (Abraham C. & Sheeran P., 2015)

The theory has six constructs which are:

#### 3.1.1. Perceived Susceptibility

Susceptibility contextualized in the health study would refer to the danger or risk that an individual has to a certain disease (Burke., 2010). In the health belief model perceived susceptibility refers to an individual's perception of the risk of acquiring a sickness. It is the belief that a person has on chances of getting a certain disease.

#### 3.1.2. Perceived Severity

This is a person's feelings on the seriousness of getting a sickness. It involves how much a person believes a certain condition and its consequences can have an effect on his/her health. An individual's perceived seriousness of a disease can be brought about by the medical information given on the disease on its consequences but it can also be as a result of an individual beliefs that the disease will affect him economically, socially and other aspects of life (Turner, 2012).

#### 3.1.3. Perceived Benefits

This is a person's view of the effectiveness of various actions at his/her disposal to reduce the threat of a sickness. It is individual's belief in the effectiveness of the action to reduce the impact and risk seriousness (Abraham C. & Sheeran P., 2015). The benefits are the stated positive effects of the action. In the health belief model these benefits are better mental and physical health which results to better quality of life (Burke., 2010).

#### 3.1.4. Perceived Barriers

This is a person's feelings on the hindrances to taking a recommended health action, it is the costs that individual beliefs will incur if a certain behavior is practiced, barriers could be reasons why there is no change of behavior (Burke., 2010).

#### 3.1.5. Cue To Action

It is the catalyst required to trigger the process of decision-making to accept a recommended health action, these may include SMS reminder, the death of a family member or close friend or disease risk warning messages (Burke., 2010). An individual who smokes and has a father suffering from cancer due to smoking, observes the pain the father goes through will most probably stop smoking (Turner, 2012).

#### 3.1.6. Self-efficacy

It was added to the health belief model in 1988, it is the level of a person's confidence in his or her ability to perform a certain behavior successfully (Abraham C. & Sheeran P., 2015). People are uncomfortable with trying something new unless they are confident that they can manage it (Rosenstock I., 2004).

The theory has three modifying variables which are:

### 3.1.7. Demographic Variables

Demographic variables are personal statistics which are for example race, sex, ethnicity, education, occupation, age and others (Burke., 2010). These personal characteristics greatly influence how people behave in different situations e.g. older people tend to be more responsible in their behavior and will be more cautious compared to young people implying that they will take information about their health more seriously compared to younger people (Lewis R. Goldberg, 2006).

### 3.1.8. Psychosocial Variables

Psychological variables are: social class, peer and reference group pressure, personality and others (Abraham C. & Sheeran P., 2015). People relate according to their social classes, they tend to share in their groups because they have common things to share (Lewis R. Goldberg, 2006).

### 3.1.9. Structural Variables

Structural variables include earlier contact with a certain disease, knowledge about a certain disease etc., people who have a contact or who know someone who has had a certain disease find the threat more real than those who have just heard about it (Burke., 2010). This helps him to be more cautious than an ordinary person (Lewis R. Goldberg, 2006).

Health belief model has been widely applied in the development of effective interventions to change health-related behaviors (Abraham C. & Sheeran P., 2015). Interventions based on the health belief model may focus on increasing perceived seriousness and susceptibility of a certain disease or health condition through provision of education about prevalence and incidence of disease, and information about the consequences of disease which could be medical, social or financial. Furthermore, interventions may provide cues to action to encourage and remind people to engage in health-enhancing behaviors (Janz NK, 2002).

### 3.1.10. Limitations of Health Belief Model

The health belief model focuses on individual differences in attitudes and beliefs in predicting health-related behaviors, but it does not address other factors that influence health behaviors (Glanz et al., 2008). A review done by Yarbrough and Braden on the utility of Health Belief Model as a guide for predicting breast cancer screening behaviors showed that the application of the model was not consistent and could only explain 47 per cent of the variance observed in screening behavior when socio-economic status was included (David Taylor, 2007). Several researchers have questioned to what extent can perceived threats affect behavioral change (marie M. Ilabre, 2010), other factors may come into play such as peer pressure, the urge to explore like in case of adolescent behavior and culture, particularly in communities with strong cultures.

Studies conducted show that the Health belief model is weak in predicting health behavior change partly because of its poor construct definition, insufficient combinatorial rules and lack of strong predictive validity of the model's major psychological components. (Christopher J. Armitage, 2007). A meta-analysis done on studies that were conducted using Health Belief Model in populations of adults focusing on quantifying the independent relationships between each of its four main constructs and the resulting health change, showed a variance of between 0.1 and 9 per cent which is a weak effect. (David Taylor, 2007)

Health behavior can be influenced by lack of information on what is good health behavior, individuals who do not know the causes of a certain disease may not know how susceptible they are (Christopher J. Armitage, 2007). Furthermore in places where cultures are deep rooted people tend to have beliefs that may affect their health. For example in cultures where people believe in circumcision and the tools are not sterilized, diseases transmitted through blood contact tend to spread easily (Cutrell, 2011). Because of these weaknesses of health belief model, a better model is needed.

## *3.2. The Safe (Surgery for Trichiasis, Antibiotics to Treat C. Trachomatis Infection, and Facial Cleanliness and Environmental Improvement to Reduce Transmission of C. Trachomatis from One Person to Another) for Trachoma Intervention*

The framework is made of four components, following is the discussion of each component.

- Provide surgical services for trichiasis ('S')

This component is made of the following sub-components.

### 3.2.1. Choose a Surgical Technique and Set Guidelines for Offering It

Eye surgery is delicate, for a safe surgery WHO recommends the bilamellar tarsal rotation procedure. To avoid high costs of retraining doctors it is recommended that the procedure should not be changed unless of surgical failure.

### 3.2.2. Determine the Structure of the Service

WHO recommends that two strategies be used simultaneously, one surgical session at trachoma-endemic area and another in the hospital.

### 3.2.3. Calculate the Number of Surgeons You Will Need

WHO recommends two surgeon doctors at each surgery site.

#### 3.2.3.1. Train and Supervise Trichiasis Surgeons

Most countries with trachoma have inadequate ophthalmologists and therefore there is need to train medical assistants and nurses to assist, trainers should be well experienced ophthalmologists, in one group the maximum that can be trained is six.

#### 3.2.3.2. Equip Trichiasis Surgeons

Each surgeon should be well equipped to perform the job.

#### 3.2.3.3. Identify Cases and Encourage Surgery

Cases that require surgery should be carefully identified and the patients encouraged to be operated on.

#### 3.2.3.4. Operate

Once a patient has been identified and accepted to be operated on then the operation should be done.

#### 3.2.3.5. Follow Up

After the operation a follow should be done and sutures removed 7–10 days after surgery.

#### 3.2.3.6. Supervise District Surgeons

A senior surgeon should check on the other surgeon to ensure no incidences of failures.

### *3.3. Give Antibiotics ('A')*

For trachoma control WHO currently recommends two antibiotics; azithromycin and 1% tetracycline eye ointment. The following are the sub-components of this component.

#### 3.3.1. Register Antibiotics

The antibiotics must be registered

#### 3.3.2. Set Guidelines for Starting and Stopping Antibiotic Treatment

If the prevalence is 10% or above in 1–9-year-old children antibiotic treatment should be done for all residents annually for three consecutive three years

#### 3.3.3. Undertake a Pilot Treatment Round

The first treatment should commence with a small-scale trial unless a there was a previous mass treatment

#### 3.3.4. Determine Requirements for and Order Antibiotics

It is critical that there is sufficient antibiotics all the time, in case they are depleted more should be ordered.

#### 3.3.5. Make Sure That Appropriate Storage Is Available

There should be enough and clean space to store the drugs to ensure availability and safety.

#### 3.3.6. Import Antibiotics and Deliver to Districts

Most countries which a trachoma endemicis poor and therefore they don't manufacture the antibiotics, to ensure continuous supply, imports should be done early.

#### 3.3.7. Select and Train Treatment Personnel

The treatment personnel should be educated people and should be well trained to ensure correct prescription.

##### 3.3.7.1. Plan the Treatment Calendar

The treatment should be well scheduled and early to achieve maximum results, treatment during festival or holiday should be minimized.

##### 3.3.7.2. Prepare a Census of the Community

It is important to know the size of the population in order for the treatment to be effective.

### 3.3.7.3. Sensitize the Community

Before the treatment is one community sanitization should be done to ensure maximum response.

- Treat
- Obtain high coverage
- Manage adverse reactions and collect information about their
- Incidence
- Report

### 3.4. Promote Facial Cleanliness ('F') and Trachoma Control in General

- According to the SAFE framework health promotion is essential in
- Encouraging surgery acceptance
- Improving antibiotics acceptance
- Teaching people about trachoma
- Promoting facial cleanliness
- Encouraging clean environment

### 3.5. How to Improve Water and Sanitation ('E')

Improving personal hygiene, water and environment cleanliness is essential in reducing C. trachomatis transmission. It is essential to have toilets and defecate in the correct places.

The SAFE model by the world health organization envisages to get rid of diarrhea in the world by the year 2020(WHO, 2019).The framework makes an assumption of availability of doctors, health facilities and drugs in trachoma endemic areas(Buchan J.& Veema S., 2018). The model doesn't take into consideration that trachoma is a disease of the poor and it is common in poor countries where drugs are not available, health facilities and personnel are scarce(Njomo et.al, 2016). In order to implement the SAFE model effectively sufficient resources must be available and health personnel and facilities must be enough for the population which is not feasible in poor countries(WHO, 2019).

Trachoma is a disease of hygiene and it can be easily controlled with proper hygiene, if people can be educated how to maintain good hygiene and it benefits ,trachoma can be greatly reduced(Buchan J.& Veema S., 2018). Governments have tried to educate people about trachoma but the technologies they use are not suitable for poor communities, we suggest a model that can be suitable for trachoma intervention for poor communities.

### 3.6. Trachoma Intervention Framework

In our literature survey we looked at two frameworks that have been used for health promotion which are the health belief framework and SAFE framework, we identified their shortcomings and the improvements required in order to get a suitable trachoma intervention framework. We identified the following constructs that can be integrated to produce a suitable trachoma intervention framework: suitable trachoma information communication technologies, increasing trachoma awareness, practices trachoma prevention strategies, reducing trachoma prevalence. We develop a trachoma intervention framework using the identified elements.

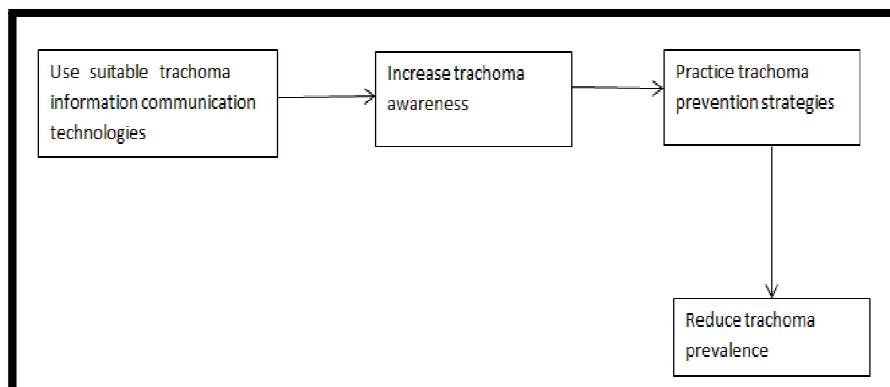


Figure 3: Trachoma Intervention Framework

## 4. Discussion of the Framework

The framework consists of four elements; use suitable trachoma information communication technologies, increase trachoma awareness, practice trachoma prevention strategies, reduce trachoma prevalence. We discuss each element

### 4.1. Use Suitable Trachoma Information Communication Technologies (Icts)

Since trachoma is a disease of the poor, in order to communicate intervention information effectively it is critical to know which technologies are suitable for the people i.e. the communication technologies that they can afford, are user friendly and can fit in their context. Since most of the poor communities' levels of illiteracy are high, the technology should communicate in the language preferred by the listeners.

#### 4.2. Increase Trachoma Awareness

Raising trachoma awareness is the next element that was identified, when a suitable technology for the poor is used it would lead to increase in trachoma awareness (Burris, 2013) .

#### 4.3. Practice Trachoma Prevention Strategies

When the levels of disease awareness are enhanced, research shows that people would adopt disease intervention practices (Fraser, 2010).Trachoma is a disease caused by unhygienic conditions which can be improved by health education (Buchan J.& Veema S., 2018).Hygienic practices such as washing the face with clean water, defecating in the toilet are simple practices but they lead to reduced trachoma prevalence. (Buchan J.& Veema S., 2018)

#### 4.4. Reduce Trachoma Prevalence

Improved trachoma intervention practices leads to reduced trachoma prevalence (WHO, 2019).Reduced trachoma prevalence is the main goal of the trachoma intervention and therefore if zero prevalence can be achieved then the world can be declared trachoma free.

### 5. Conclusion

We conducted a literature survey and identified trachoma intervention strategies that exist and their weakness, we also identified the key elements that are necessary for trachoma intervention. Using the identified elements we developed a framework that can be used for trachoma intervention, we argue that the developed framework if adopted can significantly contribute to the war against trachoma and can boost world health organization's initiative of eradicating trachoma by the year 2020.

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