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TRACHOMA IN THE TAGANT REGION OF MAURITANIA

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Abstract

Introduction: Trachoma is a keratoconjunctivitis caused by the bacterium Chlamydia trachomatis, transmitted through dirty hands, contaminated clothing, and flies. Trachoma remains a significant public health issue in developing countries, including Mauritania, particularly in the Tagant region.

Objective: To determine the prevalence of follicular trachoma (TF) and trachomatous trichiasis (TT) in the Tagant region.

Materials and Methods: This retrospective longitudinal analytical study, spanning 2004–2017, was based on a series of surveys conducted by the National Blindness Control Program (NBCP) and its partners.

Results: Our study revealed the following prevalence rates in the Tagant region:

- Follicular trachoma (TF): 24.35% in 2004, 6.8% in 2007, 0.6% in 2011, and 4.13% in 2017.

- Trachomatous trichiasis (TT): 0.85% in 2004, 0.70% in 2007, 0.06% in 2011, and 0% in 2017.

The average therapeutic coverage rate during Mass Drug Administration (MDA) campaigns was 85%.

Conclusion: Trachoma, a major public health problem in the Tagant region in the early 2000s, has significantly declined. This reduction is attributed to the implementation of the SAFE strategy, particularly its "S" (Surgery) and "A" (Antibiotics) components, transitioning the region from an endemic state to the pre-certification phase, which now requires epidemiological surveillance.

Keywords: Trachoma, Prevalence, Tagant, Mauritania

1. INTRODUCTION

Trachoma, the quintessential social disease, is one of the most widespread and ancient ophthalmological conditions **[1].** It is a keratoconjunctivitis caused by Chlamydia trachomatis transmitted through dirty hands, soiled linens, and flies. It primarily affects the most underprivileged regions **[2].**

The Tagant is an administrative region (wilaya) located in central Mauritania, also called the Tagant Plateau. Its capital is Tidjikdja. Migration linked to invasions, droughts, and the region's isolation has contributed to the population decrease in Tagant, which barely numbered 70,000 inhabitants in 2009.

The three departments of the Tagant region are Moudjeria, Tichit and Tidjikja.

The Tagant has numerous oases with multiple date palms.

Trachoma remains globally the leading cause of preventable blindness, impacting children's future in terms of learning and socio-professional integration. Following repeated infections, scars form, eyelashes turn inward (entropion/trichiasis). The constant rubbing of eyelashes on the cornea leads to corneal opacities and permanent blindness. As such, it represents a very heavy burden for society and, independently of the suffering of affected patients, it creates a genuine public health problem and major disability **[3]**. Certain groups are known to be

vulnerable: preschool-aged children and women aged 15 and older. Trachoma has gradually disappeared in industrialized countries with improved socio-economic conditions and hygiene practices. This preceded the availability of any antibiotics. However, it persists as residual foci in some countries of Central America, South America and particularly in Africa **[4].**

Facing this situation, WHO launched in 1996 the general objective of eliminating trachoma as a cause of preventable blindness by 2020. A coordination body for efforts to achieve this objective was created: The WHO Alliance for the Global Elimination of Blinding Trachoma by the year 2020 or GET2020. This Alliance placed Mauritania among countries requiring priority intervention.

A global strategy based on the evolution of trachomatous disease was proposed: the "**SAFE**" strategy **[5]**. This strategy combines trichiasis surgery (**S**); antibiotic treatment of active cases (A); facial cleanliness in children (**F)** and finally environmental change (**E**) to definitively eliminate blinding trachoma.

Today, the number of people who should benefit from components **A**, **F** or E of the **SAFE** strategy has decreased from 204 million in 2014 to 192 million in 2015. In 2016, 190.2 million people worldwide needed A, N or CE interventions for trachoma elimination. Among these people, 90.1% lived in the African region and 39% were inhabitants of Ethiopia in 2016 **[6].**

This work aims to determine the prevalence of follicular trachoma (TF) in children aged 0-10 years and trachomatous trichiasis (TT) in women aged 15 years and older in the Tagant region of Mauritania and to evaluate certain risk factors related to latrine use and the presence or absence of animals.

2. MATERIALS AND METHODS

2.1 Study Design

This is a longitudinal, retrospective, multicenter, descriptive study with an analytical focus based on survey series conducted by the NBCP targeting the Tagant region to determine the prevalence of trachoma in all its forms (particularly TF and TT) in order to implement actions aimed at eliminating blinding trachoma.

2.2 Study Setting

Originally, surveys conducted by the NBCP covered rural and urban populations across the country. A baseline survey administered in 2000 allowed establishing a national trachoma mapping, and the NBCP developed in collaboration with its partners an action plan aiming for trachoma elimination by 2020 in accordance with the WHO Global Initiative (Global Elimination of Trachoma by 2020 GET2020). Then, field interventions were implemented and evaluated through cascade impact surveys (2004-2007-2011-2017). These surveys focused on vulnerable groups (children aged 0-10 years and women aged 15 years and older).

The choice of the Tagant region is motivated by data availability and regularity over the period, the high prevalence level recorded, and the existence of residual pockets requiring targeted mass treatment.

2.3 Sampling

The surveys concerned rural and urban populations in the Tagant region.

We calculated the sample size using each of the presumed prevalences in the region based on data from the 2000 Trachoma Prevalence and Severity Survey (EPGT2000).

Sampling was based on data from the 2000 General Population and Housing Census (RGPH 2000) and the 2013 General Population and Health Territories Census (RGPTS 2013).

Cluster homogeneity effects were assumed constant and not exceeding 2. A precision of 95% was taken into account.

To determine the number of people to survey, we applied the following formula:

$$\boldsymbol{n = k \times t^2 \times \frac{p \times q}{d^2}}$$

Where:

n: sample size for each District

K: cluster homogeneity effect

t = 1.96 for 95% precision

p: TF prevalence provided by RGPH 2000

q = 1-p

d: deviation

This was a two-stage random sampling. The primary sampling units were the Census Districts (DR).

The sample selection was conducted in two stages:

1. First-stage selection: Drawing the DR

2. Second-stage selection: Randomly drawing households within each DR

2.4 Inclusion and Exclusion Criteria

Included in this study were all trachomatous or non-trachomatous subjects habitually residing (six months or more) in the sampled locality or neighborhood. All trachoma cases were diagnosed and recorded using the simplified trachoma grading system proposed by the WHO Prevention of Blindness Programme. Excluded were all trachomatous or non-trachomatous subjects residing less than 6 months in the sampled locality or neighborhood. Also excluded were all uncertain cases. Refusals were excluded.

2.5 Materials

2.5.1 Examination Procedure

The examination was performed using binocular loupes (X 2.5) under adequate lighting, daylight or torchlight. The examiner first looked for the presence of eyelashes turned inward toward the globe (TT), then corneal opacity (CO), in which case a visual acuity examination would be necessary.

They then looked on the tarsal surface for signs of inflammation (TF and TI) and scarring (TS). Each eye was examined separately, and any sign had to be clearly seen to be considered present. In case of doubt, a sign was considered absent.

Adult subjects sat facing the examiner, who was also seated. Children could stand facing the examiner. For infants and very young children, their heads were placed between the examiner's knees, face upward, with the child's body firmly held on the knees of another adult sitting facing the examiner.

After finishing examining a subject, the examiner cleaned their hands with an appropriate disinfectant and let them dry before examining the next subject's eyes. They also had to ensure that all examination data had been recorded on the form.

2.5.2 Examination Tools

They included:

- Torches

- Binocular loupes allowing 2.5x magnification

- Optotypes presented as plasticized, washable cards. The "E" was printed in two formats: 0.3 and 0.1

- A standard string 6 meters long, with a knot exactly in the middle (3m) to ensure measurement distance reproducibility during successive examinations in different locations

- 1% tetracycline ointment

- Disinfectant

- Soap

- Tissue papers

2.5.3 Data Collection

Data collection was carried out through two survey forms:

2.5.3.1 Trachoma Prevalence and Severity Survey Form

It focused on two essential sections:

1. Identification (region, district, commune, locality, DR, health facility, number of children under 10 examined)

2. Census and diagnosis (Age, sex, household size, trachoma forms, localization right eye (OD) left eye (OG)).

2.5.3.2 Visual Acuity Measurement Form for TT and/or CO Patients

It contained the following elements:

- Identification of the person with TT and/or CO

- Questions related to patients with Trichiasis

- Questions related to patients with Corneal Opacity

- Visual acuity measurement.

2.5.4 Data Analysis

The collected data were entered into Excel 2013 and then processed using IBM SPSS Statistics 20 for the part related to data cross-tabulation and application of linear regression (trend), Analysis of Variance (ANOVA) tests, Kruskal Wallis test and Chi-square test (a $P<0.05$ was considered significant).

3. RESULTS

The highest TF prevalence was in Tidjikja district with a rate of 30% in 2004 then 7% in 2007 and 4.13% in 2017 (Table I).

Table I: TF Prevalence in Tagant Region from 2004 to 2017

Year	Tidjijkja	Tichit	Moudjeria	Tagant
2004	30%	20.40%	22.65%	24.35%
2007	7.0%	5.70%	6.10%	6.80%
2011	0.9%	0.3%	0.50%	0.60%
2017	4.13%	4.13%	4.13%	4.13%

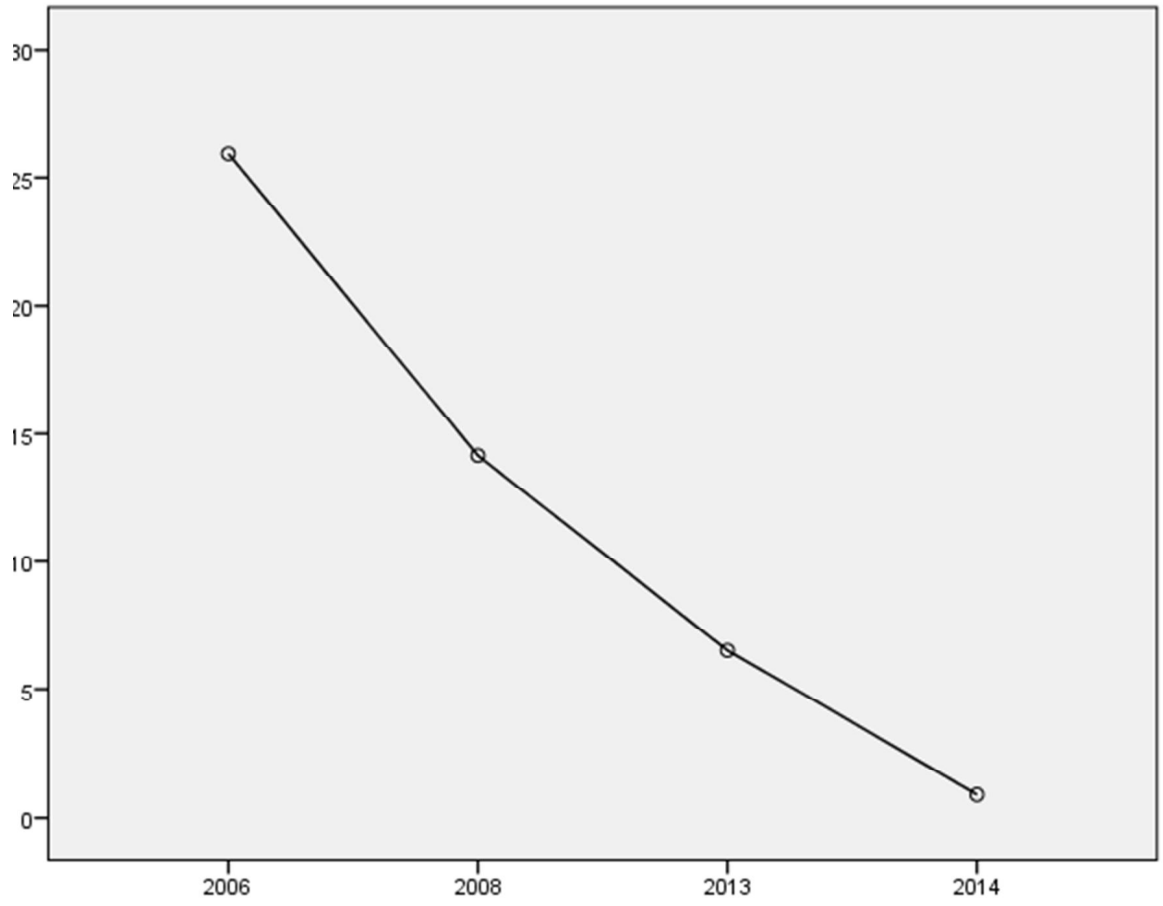
Table II: Trachomatous Trichiasis Prevalence in Tagant Region from 2004 to 2017

Year	Tidjijkja	Tichit	Moudjeria	Tagant
2004	1%	0.00%	0.70%	0.85%
2007	1%	0.00%	0.53%	0.76%

2011	0.10%	0.00%	0.03%	0.06%
2017	0.00%	0.00%	0.00%	0.00%

General Trend:

The trend analysis of TF prevalence shows a considerable regression of trachoma over time (a strong and significant negative correlation, high determination coefficient).



4. DISCUSSION

The objective of this study was to determine the prevalence of active trachoma and trachomatous trichiasis, to guide the interventions of the national trachoma control program in the Tagant region.

The choice of a longitudinal study allowed us to analyze all survey series conducted by the NBCP and its partners from 2004 to 2017.

In this work, we used the WHO simplified classification to code the different trachoma stages.

These surveys were followed by mass treatment campaigns with azithromycin and evaluation of risk factors, particularly absence of latrines and presence of animals in households.

At the beginning of our surveys, WHO recommended that once a district reached a prevalence <10%, azithromycin distribution should stop and this district should be considered provisionally cleared of trachoma.

Reinforcement of hygiene promotion, along with implementation of epidemiological surveillance measures, is then necessary to prevent disease resurgence.

Currently, trachoma elimination as a public health problem targets the following thresholds **[6]**:

1. A prevalence of trachomatous trichiasis (TT) cases <0.2% in individuals ≥15 years (or <1 case per 1000 in individuals of all ages);

2. A TF prevalence <5% in children aged 1 to 9 years, in each previously endemic district;

3. Evidence that the health system continues to identify and manage incident cases.

Moreover, the 2017 national trachoma evaluation survey in which the evaluation unit corresponded to the region explains the same adjusted prevalence found in all departments of the evaluation unit or region.

In our study, the follicular trachoma (TF) prevalence in Tagant region in 2004 was 24.35%. This prevalence is slightly lower than the active trachoma prevalence found in a 2004 study in Tanzania by Evertjan Jansen et al **[7]** which was 31%. On the other hand, it is much higher than the prevalence found in Vietnam in the same 2004 study by Evertjan Jansen et al **[7]** which was 14%.

In our work, trachomatous trichiasis (TT) prevalence was 0.85%. This trichiasis rate is lower than that noted in 2004 by Evertjan Jansen et al **[7]** which was 4%, and also much lower than values found in studies published in 2001 and 2004 respectively by Abebe Bejiga et al **[8]** and Kefeyalew Regassa et al **[9]** in Ethiopia which found TT rates of 5.5% and 6.8%.

Trachoma prevalence in Tagant region in 2007 was 6.80% for TF and 0.76% for TT.

The TF rate in our study (6.80%) is lower than the prevalence found in Vietnam in 2006 by Rajiv Khandekar et al **[10]** which was 13.3%. This result is also comparable to that of Antonio

Augusto V et al **[11]** conducted in Brazil in 2008 which found a TF rate of 8.9% and trachomatous trichiasis of 0.19%.

The TF and TT prevalences found in Nigeria in 2008 by Nimzing F et al **[12]** (24% for TF and 8% for TT respectively) are higher than those found in our study in 2007 (6.80% for TF and 0.76% for TT).

In 2011, we found a TF prevalence of 0.60% in Tagant region. This rate is much lower than the TF prevalence found in Burundi in 2011 by Onésime Ndayishimiye et al **[13]** which was 10%.

Regarding TT rates in our study (0.06%), this rate is much lower than the TT prevalence found in a study conducted in Guatemala in 2015 by Juan Carlos Silva et al **[14]** which gave a rate of 3%.

The 2017 survey in Tagant shows the total absence of trachomatous trichiasis cases in this region.

After each of these impact surveys (2004-2007-2011), mass treatment campaigns with azithromycin were conducted for three successive years by the NBCP and its partners.

During these campaigns, the average therapeutic coverage rate was 85.4%. It is slightly lower than the therapeutic coverage value found in Tanzania in the 2018 study by Alexander Jenson et al **[15]** which was 95%.

Regarding the F and E components of the SAFE strategy, in trachoma control, water plays a very important role through its accessibility, quantity, availability and especially its use.

Regarding trachoma, children's hygiene is generally assessed by the state of their faces. Indeed, it has been demonstrated that having a dirty face doubles the risk of being trachomatous **[16]**, because facial dirt is often associated with pathological eye and nose secretions. This dirt would attract flies that are disease vectors, as confirmed by several studies including Paul M et al's study in Gambia **[17]**. These flies are also attracted by the presence of date palms which are characteristic of the Tagant region, the focus of our study.

Face washing appears as a necessary, low-cost hygiene practice for trachoma control. Hence the importance of awareness campaigns to encourage parents to ensure daily hygiene for their children.

It should be noted that environmental hygiene is assessed by the presence of latrines, their proper use, the presence of livestock pens and waste management.

Indeed, latrines help control pollution from feces and limit contamination from flies which are recognized as the main vectors in the disease transmission chain **[18]**. Multiple studies have shown prevalence decreases when latrines existed in a household.

However, the presence and use of latrines alone are not enough to reduce fly density. Indeed, they must meet certain criteria and be maintained in a certain state of cleanliness to not become fly breeding sites **[19].**

In our study, 90% of households had latrines in their compound, which is higher than the WHO WASH target aiming for more than 80% of households with latrines.

If water scarcity certainly explains the very high trachoma prevalences in the early 2000s in Tagant, the proliferation of flies attracted by dates would constitute an additional risk factor for this disease.

At the end of our study, the trend analysis of TF prevalence shows a considerable regression of trachoma over time in all districts (a strong and significant negative correlation, high determination coefficient).

5. CONCLUSION

Blinding trachoma, which constitutes a public health problem in Mauritania, has significantly decreased thanks to the implementation of the SAFE strategy by the NBCP and its partners in accordance with the GET2020 global initiative.

At the end of this study, it appears that TF prevalence at the study outset was very high (24.35%). In 2017, this prevalence decreased to 4.13% and trichiasis from 0.85% in 2004 to 0% in 2017.

It was noted that these prevalences showed a clear, regular and constant decrease in all districts throughout our study duration (four surveys).

This notable improvement is due to the various interventions implemented by the NBCP and its partners and opens the possibility for eliminating blinding trachoma in the Tagant region.

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