

Active trachoma is an infectious disease, stop treating it administratively

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ABSTRACT

Objective: To assess how administrative considerations during prevalence surveys affected initiation of mass antibiotic treatment for active trachoma in East Pokot district in Kenya.

Methods: Survey reports were reviewed. The first was the report for a national blindness survey conducted in 1980s. The second was for a baseline trachoma prevalence survey conducted in Baringo administrative district in 2004. East Pokot was one of the divisions in the district and the survey was not powered to estimate the prevalence for the sub-district level. The third was for a survey conducted in 2011 in a newly created East Pokot administrative district.

Results: The national blindness survey report indicated that in Baringo district active trachoma was mainly found among the East Pokot communities. A total of 1,182 people of all ages were examined in the Baringo; 596 of them in East Pokot. Fifty percent of the children aged <10 years in East Pokot had active trachoma. In the 2004 survey 1,179 children aged 1-9 years were examined. The prevalence of active trachoma in Baringo district was 6.4% (95% CI: 3.9% - 9.9%), range 0% to 33.3% in the surveyed clusters. The endemic clusters were in East Pokot. In 2011 the prevalence of active trachoma in the new East Pokot district was 34.3% (95%CI: 27.7%-40.8%), range 28.1% to 41.7% in the surveyed clusters. Mass treatment commenced seven years after the initial baseline trachoma survey.

Conclusion: Emphasis should be given to epidemiology of active trachoma in determining the initiation of mass antibiotic treatment than administrative considerations.

Key words: Trachoma, Survey, Administrative districts, Epidemiology

INTRODUCTION

Trachoma is an ancient disease and the leading infectious cause of blindness in the world¹⁻³. It is commonly found in poor communities⁴. The prevalence of trachomatous Follicular Inflammation (TF) in children aged 1-9 years is commonly used as the indicator for active trachoma⁵.

The World Health Organization (WHO) recommends "AFE" for control of active trachoma, which stands for Antibiotic treatment to treat active infection and Facial cleanliness and Environmental change to reduce transmission⁶. The thresholds for mass antibiotic treatment are as follows⁷: if prevalence of TF is <10% mass treatment is not required, 10% to <30% treatment needed for 3 years and \geq 30% for 5 years prior to impact assessment surveys to justify continuation.

In hypo-endemic districts (prevalence 5% to <10%), further surveys are supposed to be conducted at the sub-district level to identify and administer targeted antibiotic treat to all the endemic villages⁷. Antibiotic treatment is stopped when the TF prevalence drops to <5% at community level. Project reports from the Kenya Trachoma Control Programme indicate that targeted treatment is difficult to implement because it is too rigorous and too expensive for district trachoma projects.

The recommended trachoma control intervention unit is the district; which is defined as the normal administrative unit for health-care management⁸ with a population size of approximately 100,000 people to 250,000 people⁷. In practice trachoma surveys are conducted by administrative districts, irrespective of the population size. Moreover, the periodic review articles on trachoma prevalence survey method hardly ever report or critically appraise the target population size for the reviewed surveys⁹⁻¹¹. In Kenya the population sizes of trachoma-endemic administrative districts vary widely. As a result, some district level prevalence surveys have failed to identify pockets of endemic communities (hot-spots) because the non-endemic population dilutes the prevalence¹².

The purpose of this study was to assess the 30 years trend of active trachoma in East Pokot as a case study to illustrate how mass antibiotic treatment can be delayed when administrative considerations are given more emphasis than the epidemiology of the disease.

MATERIALS AND METHODS

East Pokot occupies the Eastern and Northern arid areas of Baringo County in Kenya (Figure 1), which was until 2010 known as Baringo district. The prevalence

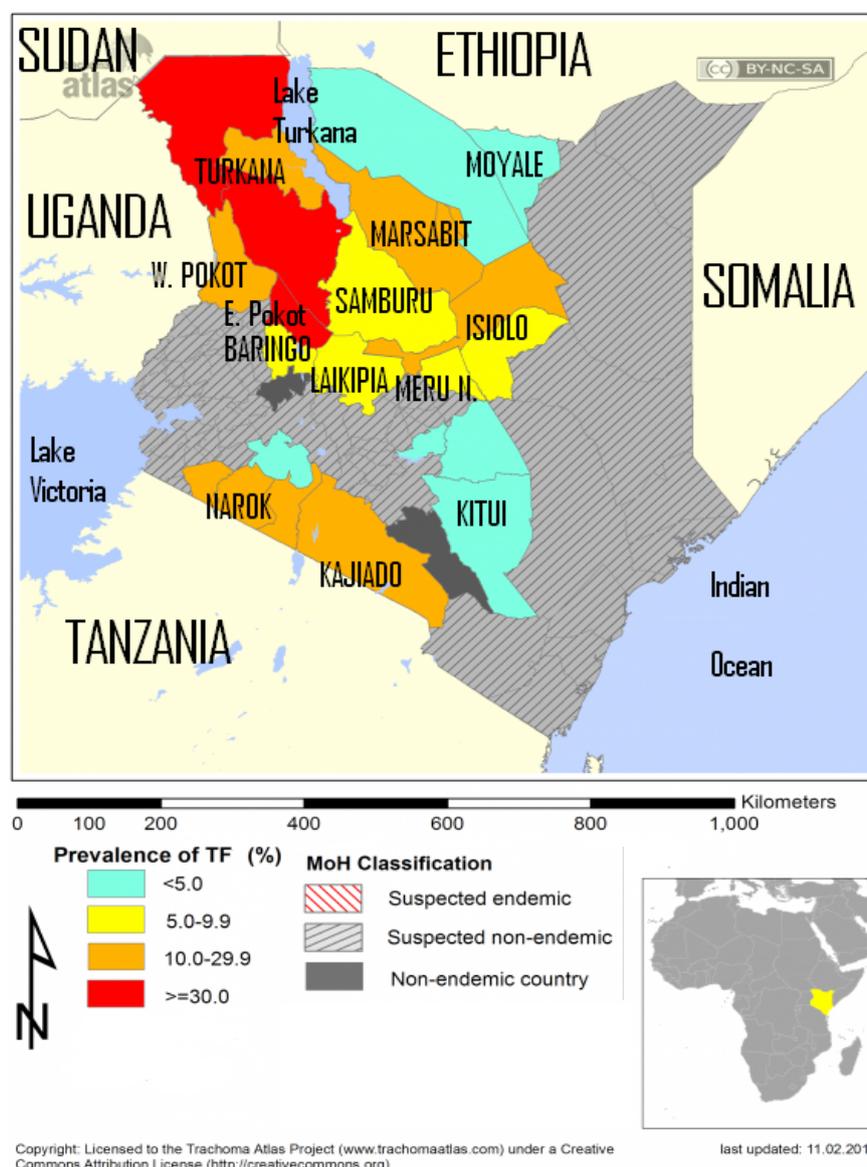
of active trachoma in Baringo district was first reported in a national blindness survey conducted between 1979 and 1989 by Whitefield *et al*^{13, 14}. They considered both follicles and papillae as signs of active trachoma. This was before the adoption of the WHO simplified trachoma grading scheme¹⁵ and the SAFE strategy⁶.

In 2004, population based trachoma prevalence surveys were conducted to justify commencement of the SAFE strategy¹⁶ in six of the suspected endemic districts in Kenya (Figure 1): Baringo, West Pokot, Narok, Kajiado, Samburu and Meru North. Baringo administrative district had 264,978 people and East Pokot was a division covering the arid North-Eastern parts of the district. The rest of the Pokot communities lived in the neighbouring West Pokot district (Figure 1). West Pokot district was also surveyed in 2004 and it qualified for mass antibiotic treatment. A two stage

cluster random sampling method was used to select the survey samples and the method published¹⁶. The sampling frame included all the sub-locations in the district. Twenty sub-locations (survey clusters) were selected using the systematic sampling method. The sample size was then distributed proportional to the population size of the selected sub-locations.

In 2010, Baringo district became a County and East Pokot an administrative district with 133,189 people. In August 2011, the Fred Hollows Foundation sponsored a repeat trachoma prevalence survey in East Pokot. The Equation 1 below was used to estimate the minimum sample size, where: b = expected prevalence; c = desired precision of the estimate; d = alpha risk (Z score 1.96) and e = expected design effect. A two stage cluster random selection method was used and the details are published elsewhere¹⁶.

Figure 1: TF map of Kenya showing the endemic Counties and East Pokot



Permission to use the maps in the trachoma atlas (open access) was granted by the International Trachoma Initiative (ITI)

Equation 1: sample size calculation formula¹⁷

$$\text{Minimum sample size} = e \frac{d^2 b(1-b)}{c^2}$$

The parameters used to compute the minimum sample size were: Assumed prevalence of TF in children 1-9 years old = 26%; similar to West Pokot¹⁶, absolute precision 5.2%, Confidence level 95% and design effect = 4. The minimum sample size for East Pokot survey was 1,093 children. A two stage cluster random selection method was used. A sampling frame was prepared using the 2009 census report. Thirty clusters, each with 40 children aged 1-9 years were selected using the systematic sampling method. A total of 1,200 children were examined.

Two villages were randomly selected for the survey using simple random sampling method. In a village, the random walk method was used to select the households. The team started at the centre of the village and indentified the direction of the first household by spinning an object. After finishing with one household, they repeated the same process to indentify the next one. Children and adults living in the selected households who satisfied the survey criteria were enumerated and examined until the sample size is achieved. A household was defined as people who

regularly eat from the same pot. Visitors were excluded. Revisits were done where necessary. Children in school and adults in the field were traced and examined. The graders were trained and validated (kappa >0.95 for all the trachoma graders).

RESULTS

The national blindness survey report indicated that trachoma was localised among the Pokot communities living in the dry north-eastern parts of Baringo administrative district. A total of 1,182 people of all ages were examined in the district, 596 of them in East Pokot. Fifty percent of children aged <10 years in East Pokot had active trachoma while in the other communities the prevalence was <25%. The sample for children selected in East Pokot was small^{13, 14}.

In 2004, the prevalence of active trachoma in Baringo district was 6.4% (95% CI: 3.9% - 9.9%). It ranged between 0% and 33.3% in the surveyed clusters (Table 1). These results indicated that TF was clustered in East Pokot division. However, an application for donation of antibiotic for mass treat was rejected because the five clusters surveyed in the division were too few for accurate estimation of the prevalence.

Table 1: Distribution of TF in Baringo district in 2004 (survey report)

Survey clusters	Children 1-9 years old		
	Total examined*	With TF	Prevalence of TF (%)
<i>East Pokot Division</i>			
1 Chepkrerat	60	20	33.3
2 Tilingwo	43	13	30.2
3 Seretion	36	8	22.2
4 Korossi	46	9	19.6
5 Nginyang East	143	17	11.9
<i>The rest of Baringo District</i>			
6 Kinyach	35	3	8.6
7 Logumgum	37	2	5.4
8 Ngambo	115	2	1.7
9 Keturwo	91	1	1.1
10 Kaptombes	19	0	0.0
11 Kapsoo	68	0	0.0
12 Kamogul	91	0	0.0
13 Tirimionin	77	0	0.0
14 Kaptumo	68	0	0.0
15 Lelmen	59	0	0.0
16 Kibongor	21	0	0.0
17 Bartolimo	81	0	0.0
18 Katumoi	17	0	0.0
19 Kesetan	35	0	0.0
20 Kisonet	37	0	0.0
Baringo District	1,179	75	6.4% (95% CI: 3.9% - 9.9%)

*The sample size for a cluster was proportional to the population size of the sub-location it was selected from

Table 2: Distribution of TF by in East Pokot survey clusters (2011 survey report)

Cluster Code	Divisions	No. examined	Children 1-9 years old	
			No. with TF	% with TF (95%CI)
1	Kollowa	40	24	60.0
2		40	7	17.5
3		40	31	77.5
4		40	4	10.0
5		40	4	10.0
6		40	6	15.0
7		40	11	27.5
8		40	25	62.5
9		40	7	17.5
10	Nginyang	40	18	45.0
11		40	8	20.0
12		40	7	17.5
13		40	19	47.5
14	Mondi	40	26	65.0
15		40	25	62.5
16		40	20	50.0
17		40	19	47.5
18		40	12	30.0
19		40	11	27.5
20		40	10	25.0
21	40	12	30.0	
22	40	15	37.5	
23	Tangulbei	40	5	12.5
24		40	12	30.0
25		40	13	32.5
26	Churo	40	15	37.5
27		40	16	40.0
28		40	17	42.5
29		40	2	5.0
30		40	10	25.0
East Pokot District		1,200	411	34.3(95% CI: 27.7%-40.8%)

In 2011, the prevalence of TF in East Pokot was 34.3% (95%CI: 27.7%-40.8%). It ranged between 5.0% and 77.5% in the surveyed clusters (Table 2). These results indicated that the East Pokot was hyper-endemic and mass antibiotic treatment was needed in the entire district. Application for donation of azithromycin was approved and treatment commenced in 2012.

DISCUSSION

This study demonstrated how the prevalence of active trachoma in a highly-endemic marginalised community was masked by the low prevalence in the rest of the administrative district, leading to a long delay in administration of mass antibiotic treatment. However, it was likely that the prevalence estimate from the national blindness survey was not precise because the sample size for children was small. Moreover, the prevalence could have been over-estimated because of the inclusion of both follicles and papillae in the case definition^{13, 14}.

The 2004 survey results revealed the distribution of active trachoma in Baringo district but the survey was powered to estimate the prevalence of active trachoma at

the administrative district level. Consequently, a repeat survey had to be undertaken to accurately estimate prevalence at the sub-district level⁷. This was finally done in 2011 after the East Pokot division was upgraded to a separate administrative district in Baringo County. The consequence of this strict adherence to survey by administrative districts criteria was that mass antibiotic treatment commenced in East Pokot seven years after the initial baseline trachoma prevalence survey.

It is important to note that the Pokot communities live in both West Pokot County and in Baringo County (East Pokot district) and their lifestyles are similar, irrespective of the County they live in. If the 2011 repeat survey was not conducted, East Pokot district would have been left out of mass antibiotic treatment as treatment continued in West Pokot.

Trachoma is an infectious disease which can be reintroduced by people visiting and then returning from untreated areas¹⁸. Left untreated, endemic nomadic communities like East Pokot (hot-spots) can increase the risk of re-infection of the neighbouring treated communities and even cross-border transmission to the neighbouring countries. Therefore, the authors urge National Trachoma Control Programmes to

seriously consider the epidemiology of active trachoma when conducting prevalence surveys and stop undue emphasis on local and international administrative boundaries.

CONCLUSION

The findings of this study demonstrate that in control of active trachoma, more emphasis should be given to the epidemiology of active trachoma than administrative considerations.

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