Facial cleanliness and prevention of cross-border spread of chlamydial infection are vital in elimination of active trachoma in Narok County, Kenya

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ABSTRACT

Background: Active trachoma is an eye infection caused by *Chlamydia trachomatis* and a dirty face is the most important risk factor. The interventions recommended by World Health Organization (WHO) are Mass Drug Administration (MDA), facial cleanliness and environmental improvements (FE). Trachoma inflammation-follicular (TF) in children aged 1-9 years old is the monitoring indicator.
Objective: To assess the progress towards elimination of TF as a public health problem in Narok County, Kenya.
Methods: Project documents were reviewed. The survey methods were published elsewhere. In Kenya, district-baseline trachoma surveys commenced in 2004. From 2010, surveys were conducted in geographical areas (segments) with 100,000 to 200,000 people each. Narok County covers the previous Narok and Transmara districts. A baseline trachoma survey was conducted in Narok district in 2004 and impact surveys in 2010 and 2014. Interventions commenced in 2007. A baseline survey was conducted in Transmara district in 2011 and interventions commenced in 2013. Impact survey is due in 2016.
Results: In 2004, 1,348 children aged 1-9 years old were examined in Narok district. Prevalence of TF was 30.5% (95% CI:25.6% - 35.8%). In 2010, 3,998 children were examined in 5 segments. The prevalence of TF in the district was 11.0% (95% CI:8.0% - 14.0%). Three segments (North Eastern, North Western and Central) had prevalence of less than 5%. The prevalence in the South Western segment was 26.7% (95% CI:18.7% - 34%) and in South Eastern segment 21.6% (95% CI:15.4% - 27.8%). In 2014, 800 children were examined in South Eastern and 720 in South Western segment. Prevalence of TF in South Western was 21.0% (95% CI:12.8% - 29.2%) and South Eastern 21.8% (95% CI: 14.2% - 29.3%). Prevalence of a dirty face in the South Eastern segment was 43.0% (95% CI: 35.9% - 50.1%) and South Western segment 31.1% (95% CI: 24.4%-37.9%). In 2011, 1,600 children were examined in two segments in Transmara district. The prevalence of TF in the district was 10.6% (95% CI: 4.6% - 16.5%), North Eastern segment 2.9% (95% CI:0% - 6.5%) and South Western 18.3% (95% CI:7.9% - 28.6%). The prevalence of dirty faces in Transmara West was 34.4% (95% CI:28.1% - 40.6%) and in Transmara East 33.1% (95% CI:19.8% - 46.4%). The South Western segment was incorporated in the Narok County trachoma control project. There were cross-border nomadic migrations between Narok County and Tanzania. Trachoma interventions in Kenya and Tanzania were not harmonized.
Conclusions: There was an impressive progress towards elimination of TF in Narok district between 2004 and 2010. Dirty faces, delayed interventions in Transmara district and cross-border migrations dampened the progress in the County. Laboratory testing is needed to verify occurrence of chlamydia infection.

Key words: Trachoma, Prevalence, Dirty face, Environmental improvements

INTRODUCTION

Trachoma is the leading infectious cause of blindness in the world and it is caused by the *Chlamydia trachomatis*. The World Health Organization (WHO) recommends Mass Drug Administration (MDA) as well as facial cleanliness and environmental improvements (FE) in communities where prevalence of TF is 5% or higher. Prevalence of trachomatous inflammation-follicular (TF) in children aged 1-9 years old is the recommended clinical indicator for active trachoma[1]. The most important risk factor for transmission of *Chlamydia trachomatis* infection is a child's dirty face[2].

District-based trachoma prevalence surveys to identify endemic areas in Kenya begun in 2004 and ended in 2012[3-5]. In August 2010, a new constitution with a devolved system of government was promulgated. Administrative districts and provinces were abolished and replaced with 47 autonomous counties. Consequently, trachoma surveys were conducted in geographical areas (segments) with 100,000 to 200,000 people each to mitigate against changing administrative units and boundaries[6,7]. The surveyed segments were used as interventions areas. Initially, WHO had recommended "trachoma districts" with 100,000 people each[8] but later adopted intervention areas with 100,000 to 250,000 people[1].

Narok County comprises of the previous Narok and Transmara districts. By early 2016, Narok was the only county in Kenya where more than one impact

surveys had been conducted. The aim of this study was to assess progress towards elimination of TF the County.

MATERIALS AND METHODS

This assessment was conducted in January and February 2016. Trachoma project reports and survey data were reviewed. All the methods used for trachoma methods in Kenya have been published elsewhere[3,5,6].

A baseline survey for Narok district was conducted in 2004 and interventions commenced in 2007. Two impact surveys were thereafter conducted in 2010 and 2014.

In Transmara, a baseline survey was conducted in 2011 and interventions commenced in 2012. The first impact survey is due later in 2016.

RESULTS

In 2004, 1,348 children aged 1-9 years old were examined in Narok district (Table 1). The prevalence of TF was 30.5% (95% CI:25.6%- 35.8%). The entire district was surveyed without segmentation.

In 2010, 3,998 children were examined in 5 segments in Narok district (Table 1). The prevalence of TF in the whole district was 11.0% (95% CI:8.0%-14.0%). The prevalence in the North Eastern, North Western and Central was lower that 5%. These 3 segments were excluded from further MDA but FE interventions were continued. The prevalence in the Southern Western segment was 26.7% (95% CI:18.7%-34%) and in South Eastern segment 21.6% (95% CI:15.4%-27.8%). Also in 2010, 3,995 children were examined for dirty faces in the district and the prevalence of a dirty face was 42.8% (95% CI:41.2%-44.4%). Eight hundred children were examined for dirty faces in each of the 2 endemic segments. In the South Western segment 440 children (55.0%, 95% CI:51.5%-58.5%) had dirty faces. In South Eastern segment 447 children (59.6%, 95% CI:56.1%-63.1%) had dirty faces.

Table 1*:* TF surveys conducted in Narok County which comprises of the previous Narok and Transmara districts

Year	Study area	Survey segments+	Children 1-9 years old examined		Prevalence of TF (95%CI)	Interventions*
			Total	With TF#		
2004	Narok	Narok district	1,348	411	30.5% (25.6%-35.8%)	AFE
2010	Narok	South Western	799	213	26.7% (18.7%-34.6%)	AFE
		South Eastern	800	173	21.6% (15.4%-27.8%)	AFE
		Central	800	34	4.3% (2.2%-6.3%)	FE
		North Eastern	800	17	2.1% (0.0-%4.5%)	FE
		North Western	799	3	0.4% (0.0%-0.9%)	FE
		Narok district	3,998	440	11.0% (8.0%-14.0%)	AFE
2011	Transmara	North Eastern	800	23	2.9% (0.0%-6.5%)	FE
		South Western	800	146	18.3% (7.9%-28.6%)	AFE
		Transmara district	1,600	169	10.6% (4.6%-16.5%)	FE
2014	Narok	South Western	720	151	21.0% (12.8%-29.2%)	AFE
		South Eastern	800	174	21.8% (14.2%-29.3%)	AFE

+From 2010 surveys were conducted in geographical areas (segments) with 100,000-200,000 people each.
#TF=Trachoma Inflammation-folicular.
*A = Antibiotics (mass drug administration), F = Facial cleanliness and E = Environmental changes

Project reports indicated that in 2010 the prevalence of TF in the South Eastern segment was 21.6% (95% CI: 15.4%-27.8%) and in South Western segment 26.7% (95% CI: 18.7%-34.6%)[6]. There was a decrease in prevalence but the endemicity did not changed and the UIG for TF was not achieved. The overlapping 95% Confidence Intervals in Figure 1 indicates that decline was not significant.

In 2014, 1,520 children were examined in the 2 remaining endemic segments in Narok district: 800 in the South Eastern and 720 in the South Western segment (Table 1). The prevalence of TF in the South Western segment was 21.0% (95% CI:12.8%-29.2%) and South Eastern 21.8% (95% CI: 14.2%-29.3%). The change in the prevalence of TF between 2010 and 2014 is shown in Figure 1. Out of the 1,520 children examined, 568 (37.4%) had dirty faces. Two hundred and twenty-four (31.1%) out of the 720 children from the South Western and 334 (41.8%) out of the 800 children from the South Western segment had dirty faces. The mean prevalence of a dirty face in the two segments was 37.4% (95% CI:32.1%-42.6%). The change in prevalence of a dirty face in the 2 segments between 2010 and 2014 is shown in Figure 2.

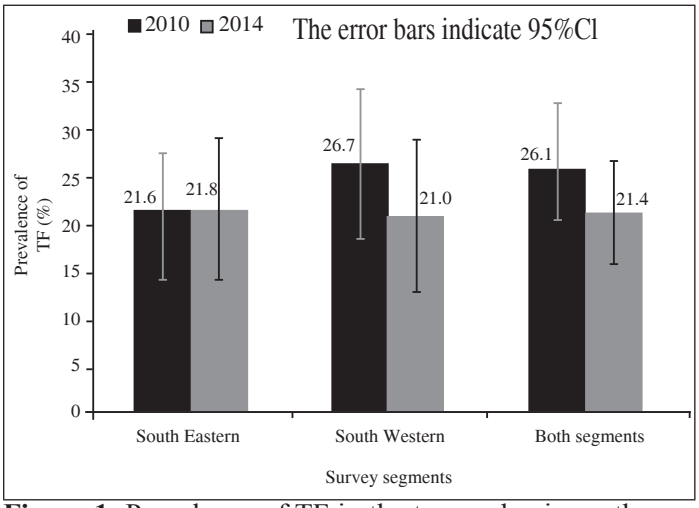

Figure 1: Prevalence of TF in the two endemic southern segments in 2010 and 2014

This means that there was a statistically significant reduction in prevalence of a dirty face but none of the segments had achieved the UIG of having 80% of the children 1-9 years old with clean faces.

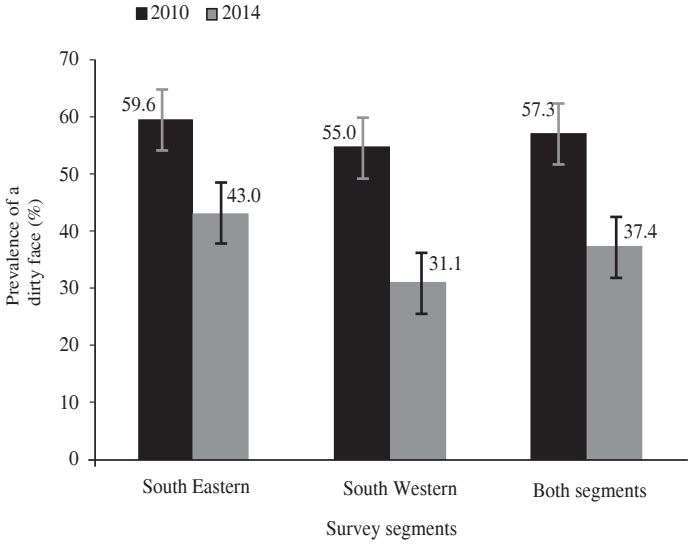

Figure 2: Prevalence of a dirty face in the two segments in 2014 and 2010

In 2011, Transmara district was divided into two survey segments and 1,600 children examined (Table 1). The prevalence of TF in the district was 10.6% (95% CI: 4.6%-16.5%), North Eastern 2.9% (95% CI:0%-6.5%) and South Western 18.3% (95% CI:7.9%-28.6%). The South Western segment was incorporated in Narok trachoma control project. Five hundred and forty-three of the 1,600 children had dirty faces: 269 and 234 in North Eastern and South Western segments respectively. The prevalence of a dirty face in Transmara district was 33.9% (95% CI:27.9%.40.0%), North Eastern segment 33.6% (95% CI:23.2%-44.0%) and South Eastern segment 34.3% (95% CI:28.0%-40.5%).

The trachoma-endemic communities in Narok county are nomadic and there is free migration across the international border with Tanzania. However, by the time this paper was written, trachoma interventions between the two areas had not been harmonized.

DISCUSSION

The was an impressive initial progress towards elimination of TF as a public health problem in Narok district following 3 annual doses of MDA which dropped the prevalence of TF from 35.5% in 2004[3] to 11.0% in 2010[6]. However, this trend was not documented in the 2 southern segments with poor facial hygiene and perennial nomadic migrations across the international border with Tanzania. Reports from other trachoma control programmes indicate that three annual doses of MDA may not eliminate active trachoma in hyper-endemic districts where trachoma risk factors are also prevalent[1].

Even though MDA was stopped in three non-endemic segments in Narok where the prevalence of TF was less than 5%, FE interventions were continued to prevent re-emergence of TF. Studies conducted in other African countries have reported re-emergence even after this elimination threshold has been achieved[9,10]. It is not clear at which prevalence level MDA should be stopped, especially when the treatment coverage is not consistent and treatment is guided by clinical diagnosis[11]. In hyper-endemic communities in Ethiopia, active trachoma was reported to have re-emerged after four annual rounds of MDA with high treatment coverage which had reduced the prevalence of infection to 2.6%[9].

A dirty face is believed to be the common final pathway for environmental risk factors[2]. All the endemic areas in Narok and Transmara districts had high prevalence (>80%) of a dirty face. Facial cleanliness will take a long time to implement since it requires provision of adequate water and behavior change.

The delayed TF interventions in Transmara district slowed the progress towards elimination of TF in the entire county. Narok and Transmara are neighbouring districts inhabited by same cultural group.

The main limitation of this study is the likelihood of confounders. Laboratory testing has never been done to confirm the occurrence of chlamydia trachomatis in Narok County. Clinical grading (prevalence of disease) was used as recommended by the WHO[1] but the aim of interventions is to eliminate chlamydial infection as a public health problem[2]. Moreover, other bacterial infections, allergy and viruses such as adenovirus, coxsackie virus and Molluscum contagiosum can cause follicular inflammation which can be confused with TF[12].

The other important confounder which were not investigated is MDA treatment coverage. The WHO recommends that the whole target population should be treated[1] and MDA is considered successful when at least 80% of the total population is treated[8].

CONCLUSIONS

There was an impressive progress towards elimination of TF in Narok district between 2004 and 2010. Dirty faces, delayed interventions in Transmara district and cross-border migrations contributed to the slow progress in Narok County. Laboratory testing is needed to verify the burden of chlamydial infection.

ACKNOWLEDGEMENT

The authors acknowledge the Narok County health workers for their support during data collection activities, members of the Ophthalmic Services Unit, Ministry of Health, Kenya for their technical support and Operation Eyesight Universal and the Fred Hollows Foundation for financial support.

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