

Distance to water source and altitude in relation to active trachoma in Rombo district, Tanzania.

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Abstract

Objectives: To investigate the relationship between distance to water source, altitude and active trachoma in children in Rombo district, Tanzania.

Methods: In each of Rombo's 64 villages, 10 *balozis* (groups of 8-40 households) were selected at random and all resident children aged 1-9 years were examined for clinical signs of active trachoma. The households of these children and village water sources were mapped using differentially corrected global positioning system data to determine each household's altitude and distance to the nearest water supply.

Results: We examined 12 415 children and diagnosed 1171 cases of active trachoma (weighted prevalence = 9.1%, 95% CI: 8.0, 10.2%). Active trachoma prevalence ranged from 0% to 33.7% across villages. Increasing distance to the nearest water source was significantly associated with rising trachoma prevalence (age-adjusted odds ratio for infection (OR) for highest quartile compared to lowest = 3.56, 95% CI 2.47, 5.14, P for trend <0.0001). Altitude was significantly inversely associated with trachoma prevalence (age-adjusted OR for highest quartile compared to lowest = 0.55, 95% CI 0.41, 0.75, P for trend <0.0001). These associations remained significant after adjustment in multivariate analysis.

Conclusion: Trachoma is endemic in Rombo district, although the prevalence varies considerably between villages. Spatial mapping is a useful method for analysing risk factors for active trachoma.

Implications of this study:

1) Increasing distance to nearest water source is associated with increased trachoma prevalence

This association supports the findings of other studies. Lack of water is thought to be a risk factor for trachoma because hygiene practices such as face washing protect against disease. When water access is poor, frequency of face and hand washing declines.

2) Higher altitude is associated with decreased trachoma prevalence

The relationship between trachoma and altitude has not previously been investigated. There are a number of plausible explanations for the association, including differences in socio-economic status, water availability and fly density with altitude. Since flies are mechanical vectors of ocular *Chlamydia trachomatis*, the effect of altitude on trachoma transmission may be related to fly density. It may also be due to decreasing population density with increasing altitude (crowding is a risk factor for trachoma), or because of higher rainfall and improved reliability of water sources higher up the slopes. It could also be due to differences in socioeconomic status.

3) Trachoma prevalence, socio-economic status and stability of communities

According to local anecdote, households of higher socio-economic status tend to reside higher up the slopes of Mt. Kilimanjaro. Many 'down-slope' communities are relatively new, comprising people who have moved from up-mountain because of lack of land, and therefore do not have the cohesiveness of more established villages. Such communities may have poorer access to healthcare and education.

4) Children with a fly on their eye ('fly-eye') were significantly more likely to have active trachoma (age-adjusted OR 3.98 95% CI 2.98-5.31). Prevalence of 'fly-eye' was inversely correlated with altitude.

This provides more support to the role of flies in the association between active trachoma and altitude, as well as supporting the use of fly control in order to fight trachoma transmission.

5) Trachoma prevalence varies considerably between villages

Prevalence in individual villages in Rombo varied between 0% and 34%. While this variation may primarily be due to the large differences in access to water sources and altitude that were found to be associated with trachoma prevalence, it highlights that small pockets of high prevalence areas could remain within a region with a typically low trachoma prevalence.

6) Prevalence of active trachoma decreased strongly with increasing age, but there was no relationship with gender. Prevalence was substantially higher in Masai than other ethnic groups (predominantly Chagga).

The relationship between active trachoma prevalence and age is well established and the results of this study are consistent with other studies. Trachoma prevalence was lowest amongst children of Chagga ethnicity (weighted prevalence 8.9%, n=11 296). Masai children had the highest weighted prevalence (42.9%, n=32). For Kamba, Mpare and Msambaa children, weighted prevalences were 14.7% (n=54), 14.1% (n=497) and 9.1% (n=294), respectively.