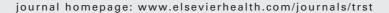# Issues in defining and measuring facial cleanliness for national trachoma control programs

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Summary   The WHO trachoma control strategy includes promotion of facial cleanliness to interrupt transmission. However, scant data exist on measuring a clean face. Our goals were to determine reliable indicators of a clean face in a child, and disparities between the assessments of faces at a clinic versus at home. Five hallmarks of a clean face were assessed on 50 children in Tanzania. In five districts, 973 children (age 1—5 years) were evaluated for facial cleanliness at home, and again 2 days later at a central location for a trachoma examination. Data on environmental risk factors were collected. Only three signs, ocular and nasal discharge, and flies on the face, were reliable indicators of facial cleanliness (kappa > 0.6); dust and food were less reliable. Unclean faces were more prevalent when measured at home (62%) than at the clinic (51%), although both were related to trachoma. The environmental markers of absence of latrines and tin roofs were consistent markers across all districts of households at risk of poor facial cleanliness. We conclude that for accurate estimates of clean faces, some assessment strategy outside the clinical environment is necessary. Additionally, behavior change programs in these districts in Tanzania should especially target families without tin roofs or latrines.
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1. Introduction

Trachoma is the leading infectious cause of blindness in the world (West, 2004). Caused by repeated episodes of ocular *Chlamydia trachomatis* infection, trachoma affects the most disadvantaged communities in some of the poorest countries on earth (Resnikoff et al., 2004). The WHO, recognizing the important public health impact of trachoma, has adopted a resolution to eliminate blinding trachoma by the year 2020 (WHO, 1998). In order to accomplish this ambitious goal, WHO recommends the use of the SAFE strategy for countries implementing trachoma control programs. This multi-faceted approach includes **S**urgery for trichinosis cases, **A**ntibiotics to treat the community pool of infection, **F**ace washing to reduce transmission and **E**nvironmental change.

Findings consistently show that an unclean face is associated with trachoma and that flies, a possible physical vector of *C. trachomatis*, are attracted to an unclean face (Emerson et al., 2000; Schemann et al., 2002, 2003). A community-based trial of face washing showed lower prevalence of severe trachoma in children who had clean faces, and sustained clean faces were associated with lower odds of all trachoma (West et al., 1995). These findings bolster the importance of including face washing as part of trachoma control efforts.

However, there is lack of agreement on what signs indicate a clean or unclean face, and thus there is no consensus on how to measure a clean face for national programs. Another potential issue is the location of the assessment, as it is often done at the time of a clinical assessment for trachoma. Although this approach makes sense based on practical considerations, anecdotal reports suggest that such assessments over-report facial cleanliness.

Standardization of reliable measures of facial cleanliness and some practical knowledge of the timing of assessment are crucial to interpreting data across countries. National trachoma control programs routinely include assessment of facial cleanliness in children, using more haphazard approaches, as one hallmark of the success of their trachoma health education interventions. The evidence base for assessment that can be used globally is urgently needed.

In order to address these issues, we report here data from work in Tanzania on the reliability of grading various signs of an unclean face, the concordance of measures of clean faces assessed at home and at the site of clinical examination, and results of analyses on risk factors for having an unclean face.

2. Materials and methods

2.1. Definition of a clean face

Several components of an unclean face were considered as possible signs, and these have been used previously (West et al., 1991). Grading a face required the observer to look at the face full front and observe the following: (1) dust on the face, exclusive of neck, hair or ears; (2) food particles around the mouth or cheeks; (3) 'sleep' or discharge on the eyelashes or around the eyelid that is easily visible (excluding signs if the child was currently crying); (4) nasal discharge visible on the outside of the nose, upper lip or cheek; (5) at least one fly landing on the face (exclusive of hair, ears or neck) in a period of 3 s of observation. A training session with six 'face graders' was undertaken, using pictures of children with each sign or combination of signs. A series of 10 children were then graded openly with all graders and the senior grader (HM), followed by independent grading of 50 children selected as a convenient sample in one community in Kongwa, Tanzania. Kappa statistics were calculated for presence and absence of each sign. Data on agreement are reported to justify why certain signs were not included in the current definition. We chose kappa > 0.6 as the criterion for keeping a sign as part of a clean face.

2.2. Definition of trachoma

Each child was also assessed at the clinical examination for the signs of follicular trachoma (TF) and severe inflammatory trachoma (TI) by an experienced trachoma grader using a 2.5 loupe. The signs of trachoma were assessed according to the WHO Simplified Grading Scheme (Thylefors et al., 1987), and any trachoma defined as the presence of TF and/or TI.

2.2.1. Assessment of a clean face: population
We used a three-part definition of a clean face, based on the data above, as part of our project on the prevalence of trachoma in multiple districts in Tanzania. We only included the following signs: ocular discharge, nasal discharge and flies alighting on the face within a 3-s interval. This current study was part of a larger study of the assessment of trachoma in children aged 1—5 years, carried out in multiple districts in Tanzania that are enrolled in the Tanzania National Trachoma Control Program. Depending on village size, between 110 and 130 households with children 5 years of age or younger are selected at random, and within each household all children 5 and under are listed, and one is selected at random for evaluation. The data included in the report were collected between May 2006 and April 2007. The census of the households was obtained by visiting the household, seeking oral informed consent from the guardians to participate, and selecting at random from a complete household census one child who was aged between 6 months and 5 years. The child and caretaker were given an appointment to come to a nearby site for clinical assessment of trachoma within the next 2 days. In two randomly selected villages in each district, the facial cleanliness of the child was assessed at the time of the household census, when the census team member could observe the child in a more natural setting, as well as at the time of registration for the trachoma examination. The census was done starting at mid-morning as were the clinical examinations, so morning face washing would have been accomplished.

2.2.2. Assessment of a clean face: risk factors
We assessed personal, household and program characteristics potentially associated with facial cleanliness status. The questions were asked, and observations made, of all households in the larger study. Characteristics included age and gender of the child. We observed the presence of any tin roofing material on the roof over the house belonging to the mother of the child, which was coded as: all tin on the roof, some tin on the roof, no tin on the roof. We observed the presence of a latrine which the mother indicated belonged to the household. We asked the mother if she knew of village health education messages about facial cleanliness. In the Tanzania National Trachoma Control Program, village health workers were supposed to conduct village level sessions on hygiene for children. We asked about such sessions in the previous year.

2.3. Data analyses

For analysis four groups were created: children who were clean both at home and at the clinic, children unclean