

Original article

## Contributions to the Improvement of Living Conditions among Neglected Populations with Trachoma

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### Abstract:

**Objective:** Trachoma (*Chlamydia*-triggered blinding infection) provoked irreversible visual impairment in about 8 million people in 2011, and the prevalence among children with dirty faces is more than three fold that among children with clean faces. In 250 villages with a high prevalence of trachoma (Kolofata district, Far North Region, Cameroon), the lack of water for facial cleanliness was reported during trachoma awareness campaigns. The objective of this study was to determine if the lack of water was linked with the absence of means to dig wells.

**Methods:** Wells, waterholes, motorcycles, irrigation pumps, electricity, goats and oxen, cell phones and distance from waterholes were recorded in January 2011 in 50 randomized villages of Kolofata's district.

**Results:** The number of villages with <25 goats and <5 oxen was 0 and the number of adults owning <1 goat was 0. The cost of a pail of water was 0.01 USD. Motorcycles, cell phones and televisions have been reported in more than 66% of villages. The cost for the construction of lined shaft wells ranged between 15–35 goats and 0.5–3 oxen; the cost for drinking water wells ranged between 50–200 goats and 3–30 oxen.

**Discussion:** No link between the means for digging wells at the village level and access to water was found. Social solidarity, which refers to a social debt owed by each person to his/her group, should be added to training guides to gauge its ability to release people from the dead end of having to wait for external assistance to gain access to water.

**Key words:** Neglected Populations, Trachoma, Blindness, Water, Well, Waterholes, Hygiene, Infection, *Chlamydia*

### INTRODUCTION

Trachoma, an infectious disease triggered by *Chlamydia* [1, 2] is responsible for approximately 3% of the world's blindness. The World Health Organization (WHO) estimates that trachoma provoked irreversible visual impairment in about 8 million people in 2011. If blindness is to be prevented, more than 100 million people need treatment, and emphasis should be placed on measures for hygiene improvement. Trachoma continues to be hyper endemic in many of the poorest and most remote poor rural areas of Africa [1, 3, 4–7], Asia [1, 8, 9], North (Mexico), Central (Guatemala) and South America (Brazil and Colombia) [1, 10–14], Australia [15, 16] and the Middle East [1, 16]. Trachoma is a warning signal for poor sanitation and insufficient water in extreme poverty environments [1, 3, 14, 17].

This blinding infection is transmitted through contact with eye discharge from an infected person (via towels,

handkerchiefs, fingers, etc.) and by eye-seeking flies [1, 18]. After years of repeated infection, the inside of the eyelid may be scarred so severely that the eyelid turns inward and the lashes rub on the eyeball, scarring the cornea. If no proper treatment is administered, the cornea becomes sclerotic, lost its transparency and leads to blindness. Trachoma affects women and children, the most vulnerable members of poor communities [1, 3, 7, 8].

The World Health Organization leads an international alliance of interested parties to work for the global elimination of trachoma, the Alliance for Global Elimination of Trachoma by the year 2020 (GET 2020). International efforts to eliminate trachoma as a blinding disease are based on the WHO-developed strategy—a combination of interventions known by the acronym “SAFE” which stands for surgery for trichiasis (in inverted eyelashes); antibiotics; facial cleanliness and environmental improvement [1, 3, 7, 18–20].

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Increased water availability and increased washing should reduce transmission of trachoma by eye-seeking flies (flies are considered to be a source of infection). Breeding sites of flies can be reduced or eliminated by improving the disposal of human excreta, animal dung and sewage disposal, by changing the way domestic animals are kept, by improving food handling, and by ensuring that waste is properly managed [1, 20]. Furthermore, washing of hands, clothes, and towels may reduce the frequency of transmission [18–21]. There is strong evidence that trachoma is related to water availability, and several cross-sectional surveys showed a positive association between the distance to the water source and the prevalence of active trachoma [6–8, 22–25].

Between 2007 and 2010, anti-trachoma campaigns were conducted by local ophthalmologists and nurses (trained and evaluated by WHO staff for clinical diagnosis of trachoma), who gathered the population in meetings to enhance awareness regarding hygiene [4]. Community involvement was stressed as an essential component of trachoma control and as the key to eliciting behavioral changes by promoting awareness of the disease, knowledge regarding possible solutions and action at the community level. Community agents (selected literate health aid inhabitants in each village) were involved in reaching candidates for trichiasis surgery and aiding the distribution of antibiotics. Training for chiefs of local districts, teachers, religious leaders and health aides was carried out using the following WHO guidelines and supplementary documents:

- I) Trachoma control: A guide for programme Managers: WHO|SAFE documents ([www.who.int/blindness/causes/trachoma/en/index.html](http://www.who.int/blindness/causes/trachoma/en/index.html)); (<http://www.who.int/blindness/guide/20english>); (<http://www.who.int/blindness/guide/20english>); ([http://www.who.int/neglected\\_diseases/trachoma/en](http://www.who.int/neglected_diseases/trachoma/en));
- II) Trachoma Epidemiologic Survey Protocol ([http://www.trachoma.org/sites/default/files/guidesandmanuals/prevalence\\_protocol\\_trachoma](http://www.trachoma.org/sites/default/files/guidesandmanuals/prevalence_protocol_trachoma))
- III) Trachoma control: A guide for programme managers ([who.int/publications/2006/9241546905](http://www.who.int/publications/2006/9241546905));
- IV) SAFE strategy: Preventing trachoma. A guide for environmental sanitation and improved hygiene (<http://www.trachoma.org/sites/default/files/guidesandmanuals/SAFE>);
- V) Implementing the SAFE Strategy for Trachoma Control: A Toolbox of Interventions for Promoting Facial Cleanliness and Environmental Improvement (<http://www.trachoma.org/sites/default/files/guidesandmanuals/TrachomaToolboxFinalEnglish.pdf>). Posters and booklets for children attending primary schools were provided by Ophthalmology sans Frontières.

After the first awareness campaigns for improvement of hygiene, the health agents repeatedly reported that the chiefs of villages (with a prevalence of active trachoma  $\geq 25\%$ ) blamed children's dirty faces on a lack of water due to the lack of funding by government and non-governmental organizations to build wells.

One year after the first trachoma campaign (2008), the health managers expressed their frustration regarding the results obtained after the awareness campaigns because the cleaning habits (facial cleanliness and environmental improvement in the SAFE strategy) were not substantially modified. Nevertheless, with regard to screening and mass distribution of antibiotics they reported that the procedures for the setting up of therapeutic tasks (diagnosis, antibiotic and surgery) proved to be clear, direct and practical.

One year after the first campaign, no changes in the hygienic conditions were observed (messages disseminated during the awareness campaigns following the training guides). During encounters in the villages, we sensed that the health workers and civil and religious authorities were unable to implement simple instructions for the purpose of improving the conditions regarding access to water (and better hygiene). The objective of this work was to assess if the absence of water in the villages with a high prevalence of active trachoma was linked with a lack of means to dig wells or waterholes.

## MATERIALS AND METHODS

In 2009, 250 community level health workers (community agents) were selected for the trachoma campaign in the district of Kolofata, Extreme North Province of Cameroon according to their capacity to read and explain the content of the SAFE strategy items in the trachoma guides (WHO) (<http://www.who.int/blindness/guide%20english.pdf>); ([http://www.who.int/gho/neglected\\_diseases/trachoma/en](http://www.who.int/gho/neglected_diseases/trachoma/en)); ([http://www.who.int/blindness/causes/trachoma\\_documents/en](http://www.who.int/blindness/causes/trachoma_documents/en)). This district (120,000 inhabitants, active trachoma 25% in children aged 10 or less) is composed of 250 villages or neighborhoods (200 to 2500 inhabitants/village). A series of posters and booklets designed specifically for the SAFE strategy by Ophthalmology sans Frontières (OSF) was provided to the 250 agents. The benefits of body hygiene—including washing of children's faces, clothes and wraps—were explained in the local languages to the people attending the meetings. The community agents invited all the inhabitants of the villages to awareness meetings, especially the mothers with babies. In January 2011, meetings with village chiefs and family heads were held in 50 villages randomly selected from the 250 villages/neighborhoods of the district. Several parameters were recorded during meetings with vil-

- lage chiefs and heads of families at the end of the prayers:
- a- Number of free water wells for crops and livestock
  - b- Number of free wells or waterholes for so called drinking water
  - c- Number of paying water wells or waterholes (National Water Company taps)
  - d- Average cost of a pail (between 10 and 20 liters) of water in CFA francs
  - e- One or more motorcycles in the village (less than 2 years old)
  - f- Motorized (petrol) pumps for irrigation of onions or other crops
  - g- Wires for electricity distribution
  - h- Cell phone owned by the community agents
  - i- Cell phone owned by the village chief or other inhabitants in his concession (extended family consisting of the father, one or more wives and their children. The community agents recorded widows and grandparents as part of their children’s concession).
  - j- Number of goats per extended family (concession)
  - k- Number of oxen per concession
  - l- Number of oxen per village chief
  - m- Distance (m) of concessions from free waterholes providing so-called “drinking water”
  - n- Distance (m) of concessions from paying waterholes providing so-called “drinking water”

agents reported that the number of villages where the animal population represented <25 goats and 5 oxen was 0 and the number of adults owning <1 goat was also 0. In 100% of villages the herd of oxen was >1. In 2011, the number of water sources actively maintained and used at a distance of <500 m was 0 in 25% of the villages, and in one third of the villages the distance to the waterhole for drinking water was >2000 m. In 20% of the villages with herds >500 oxen the distance to the wells was >2000 m.

As indicated in Table 1, no significant link was found between the number of free water wells for the crops and livestock and the number of free wells or waterholes for so-called drinking water or the number of free water wells for crops and livestock and the number of paying water wells or waterholes (taps with water counters installed by the Cameroon National Water Company).

The cost in CFA francs of a pail of water (between 10 and 20 liters) in paying waterholes remained the same throughout the region: 5 CFA francs (1 cent USD, monthly income per extended family ≤25 USD). The association between the number of free water wells for crops and livestock and the average cost of a pail of water in francs as not statistically significant. In 2011, motorcycles, cell phones and satellite dishes for television reception can be seen in more than 60% of the villages. The cost for the construction of different types of wells estimated by the village chiefs, and verified by the community health workers and by the nurses is indicated in Table 2. These results strongly overrule a direct association between technological progress and access to water.

### RESULTS

Out of 250 villages (Kolofata district, Sahel region of the Extreme North Province of Cameroon) the community

Table 1. Association of parameters registered in 50 randomized villages or neighborhoods in the District of Kolofata, Extreme North Province, Cameroon (2011)

	a	b	c	d	e	f	g	h	i	j	k	l	m	n
a- crops/ livestock free wells	■												**	
b- free drinking water		■											**	
c- paying wells/waterholes			■											
d- average cost of a pail of water				■										
e- motorcycles					■				x			x		
f- motorized pumps						■	x		x			x		
g- electricity wires						x	■		x					
h- agent’s cell phones					x	x	x	■	x	x	x			
i- chief’s cell phones			x		x	x	x		■			x		
j- goats/concessionx									x	■	x	x		
k- oxen/concession	x				x	x	x	x	x	x	■			
l- oxen/village chief	x				x	x	x	x	x	x	x	■		
m- distance to free water		**											■	
n- distance to paying water														■

white squares: lack of association; x: significant (positive) association ( $p < 0.5$ ); \*\*: significant (inverse) association ( $p < 0.5$ )

Table 2. Estimated price of digging a well according in 50 randomized villages in the Extreme North District, Cameroon (2011)

Characteristics of the well for water supply	Price (expressed in herd)	
	Number of goats	Number of oxen
Lined shaft well (between 8 and 15 meters) without requiring drilling through rock for watering, clothes washing and livestock	15–25	0.5–2
Lined shaft well (between 8 and 15 meters) requiring drilling through rock for watering, clothes washing and livestock	25–35	1–3
Drinking water well (lined shaft of between 30 and 80 meters without requiring drilling through rock)	50–200	3–15
Drinking water well (lined shaft of between 30 and 80 meters requiring drilling through rock)	100–200	5–30

## DISCUSSION

Trachoma control requires water availability, access to latrines and reduction in the density of flies in the environment. The results of the present study carried out in the Sahel region where active trachoma reaches proportions of  $\geq 25\%$  show that the distance required to fetch water (almost always by women, whether pregnant or not) is not linked to the wealth of the villages or technological progress.

Clean faces may be less attractive to flies, reducing transmission of *Chlamydia* [18–20]. Improved facial cleanliness (absence of ocular and nasal discharge) exerted a tangible impact on the reduction of transmission of trachoma as well as reducing auto-reinfection [3, 19, 20–22].

The prevalence of severe trachoma in children with dirty faces compared with children with clean faces showed a more than three-fold increase in cross-sectional surveys. The quantity of water used by the household may be a good predictor of trachoma; and a positive association was found between the distance to the water source and the prevalence of active trachoma [6, 18, 22–25].

Several surveys reported that the prevalence of active trachoma was significantly reduced in dwellings where the distance to water (round trip to water source) was below a threshold of 30 minutes [23–26]. Families with trachoma in Gambia used less water for washing their children than families without trachoma, and this was independent of the amount of water available, suggesting that the amount of water used for personal hygiene is an essential factor in determining further actions for the elimination of blinding trachoma [27].

In the present study, more than 15 goats and 10 oxen were observed in the 50 randomized villages out of 250 in the district. Considering the cost of a well, it is reasonable to assume that if the village chiefs or heads of families make some livestock available, access to water and the living conditions of women—who often suffer the hardship of having to fetch water—would be improved. However, the results of this survey, in which villages with no access to water had

quite numerous livestock need to be interpreted in the specific historical and cultural framework. In fact, the critical analysis of our observations over 2010 and 2011 opens up the question of the universality of inter-personal solidarity.

In Western society, the concept of social solidarity is relatively recent, especially since Léon Bourgeois' work at the beginning of the 20th century [28]. For him, solidarity was the “mutual responsibility that is established between two or more people with a connection that obligates human beings to one another” [29].

The aim of our work with the village inhabitants is not to criticize the lack of sharing or distribution of property, but to heighten people's perception of contributing something themselves, with the understanding that a goat is in fact a significant contribution. The idea of social solidarity should be deliberated as a form of non-religious humanitarianism based on a social connection that constitutes a kind of debt that each person owes to his or her group. Indeed, all organisms function only as a result of the cooperation of their individual parts with the whole [28–30].

The environment change component of trachoma-control programs generally incorporates elements of increasing water availability, improving access to latrines, reducing the density of flies in the environment, and avoiding crowding, especially in sleeping areas, as well as health education to facilitate the uptake of more hygienic behavior. The high cost of behavioral intervention was reported as a major limitation for intensive hygiene education applicability to non-research settings [21–25]. According to the analysis performed in this study, it could be hypothesized that social solidarity, without extra cost, would widen the scope of the SAFE strategy, making it not only a CHANCE (which is the acronym for SAFE in French), but CHANCES (with the S standing for the plural of chance and for the concept of solidarity, equally valid in the English language).

In conclusion, the results of the present study indicate that the lack of water in trachomatous districts is not linked systematically with a lack of means for digging wells at the village level. Consequently, the addition of the concept of

social solidarity to the awareness guides for neglected diseases and neglected populations [1, 30–31] deserves to be gauged to determine whether inter-personal social solidarity can release certain extremely deprived regions from the dead end of having to wait for external assistance to achieve access to water.

#### CONFLICT OF INTEREST

None

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