THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Environment and Trachoma in the North Region of Cameroon

Kah Evans Ngha
Lecturer, Department of Anthropology, The University of Yaounde, Cameroon

Abstract:
Environment and trachoma in the north region of Cameroon aim at finding out the environmental aspects linked to societal, habitual, individual, household-and community-level factors relevant to interventions for Trachoma prevention. Three health districts with the highest prevalence of trachoma were selected in the sample. In order to get data, a mixed method was used comprising quantitative and qualitative research methods. In-depth interviews, focus group discussions and observation techniques were used for qualitative research, as well as questionnaires for quantitative data. It was obtained that the environment constitutes an important component of trachoma disease propagation and is persistent due to the fact that the ways of life of the population have shaped their habitat, favouring this trachoma.

Keywords: *Trachoma, environment, hygiene, face washing, toilets*

1. Introduction

Cameroon falls within endemic countries in Africa, according to baseline surveys conducted in 2010 and 2011. The survey results show that trachoma is endemic in 16 Health Districts in the Far North and North regions. Poverty and limited access to adequate water and sanitation, coupled with a low literacy rate, favour very difficult living conditions. According to the third Cameroon household survey (ECAM 3), the challenges of the population are: access to water, sanitation and hygiene (WASH) and poverty, which are mutually reinforcing and highlight the need for a holistic approach to tackle both the symptoms and the underlying causes of poverty and ill-health.

This study aims to bring insight into the environment favouring the transmission of trachoma in three health districts: Poli, Tchollire and Rey Bouba. In this respect, a formative research was conducted at these various health districts to understand social and individual practices which can prevent Trachoma. The information therein shall help to plan for successful actions for F and E components of the WHO SAFE strategy to prevent Trachoma.

1.1. Problem

Environmental cleanliness is inversely related to trachoma infection. However, in the northern regions in the three health districts reported to have the highest prevalence of trachoma, there are many practices that most often expose people to trachoma. How exposed these people are to trachoma is necessary due to the fact that lifestyle and environmental challenges appear to be similar in the region. Our study there aims to identify the particularities of these health districts related to trachoma susceptibility.

1.2. Objective of the Study

The objective is to find out the environmental aspects linked to societal, habitual, individual, household-and community-level factors relevant to interventions for Trachoma prevention.

Trachoma comes from an eye infection caused by bacteria called *Chlamydia trachoma.* This infection is transmitted from one person to another, most often from one child to another or from the child to its mother in the context of water shortage, promiscuity, and absence of individual and collective hygiene. The absence or non-usage of latrines and poor management of domestic wastes and animals enable the proliferation of flies that are passive vectors of the disease.

Trachoma falls among neglected tropical diseases, endemic in fifty-five countries and affects about eighty million people worldwide, with the majority of cases found in poor rural communities (Rog et al., 2011). Communities with inadequate water supplies, poor infrastructure for sanitation and limited health services suffer a higher prevalence of trachoma.

Amongst other factors, dirty faces and poor personal hygiene behaviours among children are important factors in the transmission pathways (Taylor, 2008). If trachoma is untreated, it may result in blindness. However, the infection and transmission of the disease can be reduced by implementing the World Health Organization (WHO) SAFE strategy, which aims to eliminate Trachoma as a public health problem by the year 2020. The SAFE strategy is a series of intervention processes (World Health Assembly, 1998; Mariotti & Pruiss, 2001) to decrease Trachoma infection. The infection often begins during early childhood and can become chronic due to multiple eyelid infections if no hygienic and medical follow-up is done. Clinical signs begin with dry eyelids, then itches. Scares due to multiple infections result in the return of the

eyelid toward the interior, where opening and closing of eyelids cause friction that results in ulceration at the level of the eye surface (cornea), resulting in irreversible blindness.

A study in Egypt (Rubinstein et al., 2006) showed that there was 33% lower risk for active Trachoma when a face-washing strategy was implemented, and a study in Tanzania showed that face washing, or clean faces, among preschool-aged children in Tanzania, was associated with a significant decrease in risk for Trachoma (Rog et al., 2011). Poor access or longer distances to water and inadequate water for washing in the household have also been associated with an increased risk of Trachoma infection (Polack et al., 2006).

Studies on predictors for washing among children under the age of five years demonstrated that water supply alone did not explain face-washing habits among households. Individual perceptions and societal impediments, such as mothers' belief that it takes a bit of water to wash a child's face, along with the thought that there are more important uses for water, have also been shown to influence both the decisions and the ability to keep children clean (Rog et al., 2011).

Empiric data on the influence of environmental improvements on the prevention of Trachoma are sparse and what is available has shown mixed results. A systematic review of six studies on environmental sanitary interventions was conducted by Rabiu et al. (2012). The review showed that two trials on latrine provision for fly control did not show a significant reduction in Trachoma (Emerson et al., 2004 [The Gambia]; Stoller et al., 2011 [Ethiopia]); a health education study in Mali showed a significant reduction in Trachoma (Resnikoff et al., 1995) but not in another study in Niger (Abdou et al.,); use of Insecticide spray to reduce the fly population was beneficial in reducing active Trachoma in The Gambia (Emmerson et al., 1999) however a reduction in Trachoma was not found in a similar study conducted in Tanzania (West et al., 2004).

Most of the literature on combination studies emphasized medical and surgical treatment options (i.e., the 'S' and 'A' components of the WHO SAFE strategy for Trachoma prevention) and not socio-behavioural prevention strategies. Two studies (Ngondi et al. (2008) in Southern Sudan and Ethiopia (2010) that examined the effect of interventions implementing all the '' components of the WHO SAFE strategy showed a reduction in Trachoma. In the study conducted in Ethiopia (2010), each component of The strategy showed independent protective effects against active Trachoma: The F and E components increased the frequency of face washing (two or more times a day compared with none) and owning a pit latrine both resulted in a reduction in the odds of active Trachoma, 50% and 40% respectively. A study by Edwards et al. (2006) in Ethiopia that delivered health education about Trachoma showed a statistically significant increase in the awareness of Trachoma. However, the reduction in the prevalence of Trachoma and the adoption of prevention behaviours were not significant. The authors concluded that health education on its own was unlikely to reduce the prevalence of Trachoma.

A study by Khandekar et al. (2006) evaluated an intervention in Vietnam that included creating awareness about face washing and its role in the prevention of Trachoma and improved water access through well and latrine construction and installation of water tanks. One village received all SAFE components and another only the SA components. The prevalence of trachoma rate was significantly reduced in both villages; the F & E strategy was responsible for 58.7% of the decline at all ages and 37.4% of the decline in children under 15 years of age. There was an improvement in knowledge of prevention but not in the attitudes towards or the behaviours that prevented Trachoma, the latter being an important precursor to sustained behaviour changes. Although it may appear that hand washing may be associated with face washing and having a clean face, a literature search for this evidence yielded no significant results.

There is a lack of strategic and nationally coordinated communication responses for face washing in many Trachoma endemic countries (Sightsavers report, 2011). There has also been decreased emphasis on the 'F' and 'E' components of the WHO SAFE strategy. It has been noticed that a consolidated information repository for facial cleanliness and environmental change materials, strategies, publications, tools and products is not available. The results of this research will be useful for the development of a consolidated and comprehensive knowledge management repository of tools and guides for developing, implementing, monitoring and evaluating a behaviour change campaign to prevent Trachoma infection. The results can also provide guidance for the development of audience-specific and contextually relevant behavioural change communication campaign messages for the prevention of trachoma.

In Cameroon, according to baseline surveys conducted in 2010 and 2011, Trachoma is endemic in 16 Health Districts in the Far North and North Regions. These two regions are amongst the poorest regions in Cameroon, with very difficult living conditions, limited access to adequate water and sanitation and a very low rate of literacy.

The Ministry of Health, with the support of partners, launched an elimination trachoma project in the Far North region in 2012 through the WHO-endorsed SAFE strategy for the control and treatment of trachoma. The objective is to end the infection cycle through interventions to prevent new infections and treat existing cases of trachoma and trichiasis. The project, which covers 13 HDs out of the 28 HDs of the region, is supported by HKI for the "A" component, by Sightsavers for the "S" while the "F" and "E" components are led by the Ministry of Water and Energy through the WASH programme. (Sightsavers report 2015)

To assess the epidemiological situation of trachoma in the North Region of Cameroon, an epidemiological survey was carried out in the 15 HDs of the North Region in 2011 and 2012. The prevalence of trachomatous inflammation–follicular (TF) in children aged 1 to 9 years and the prevalence of trachomatous trichiasis (TT) in people aged 15 years and over were evaluated. The survey was part of the national trachoma control programme and was carried out by the National Blindness Control Programme of the Ministry of Public Health according to the WHO-endorsed survey methodology. Results of the Survey depict the overall TF prevalence as 4.2% (95% CI: 4.0–4.5%) in the region, ranging from 0% to 14.5% among 15 districts surveyed. Three (3) HDs (Poli, Rey Bouba & Tcholliré) show TF prevalence of ≥10% (Epidemiological survey report 2011)

In response to this study, the Ministry of Public Health adopted a national plan to eliminate trachoma in Cameroon. The vision of this plan is to make Cameroon a country where trachoma is no longer a cause of blindness and where the most vulnerable social strata live in a conducive environment, aspiring to prosperity.

2. Methodology

In order to get reliable information, variable data collection tools were used. The reason for this was to triangulate sources of information and limit the margin of error. Qualitative and quantitative data were collected within a period of 30 days in the three health districts. Documentary review, Focus Group Discussion (FGD), community visits and walk-throughs, household questionnaires, In-depth interviews and geo-referential data collection were the data collection techniques used during this study. With the quantitative approach, purposive sampling was done at the level of the health districts and random sampling at the level of the communities and households where 507 households were chosen amongst 36 communities in three health districts: Poli, Tchollire and Rey Bouba. Positioning System (GPS)machines were used to collect waypoints of water and environmental hygiene infrastructures. The Garmin 20 mm with approximation rate <5m. interpreter. The 14 households were selected in each community using random sampling with an interval of four. For a household to be eligible, it must have someone from the age of 16 years and above during the time of the interview. Ethical considerations were taken seriously on the freedom to participate, introducing the objective and importance of the study as well as the protection of informants.

Data analysis involved opened and closed questions in questionnaires and in-depth interviews, which were registered in CSPro 6.0 and analyzed using SPSS for total effectiveness through cross-tabulation.

A study on environment and Trachoma Transmission was conducted in Three (03) Health Districts: Poli, Tchollire and Rey Bouba of North Region, Cameroon. The data were put in another software called Graph Pad to come out with the significance difference P, whereby if P<0.05, there is a significance difference and if P>0.05, there is no significant difference in the data compared. Qualitative data from in-depth interviews and FGD were treated and handwritten notes were translated, transcribed and typed into a word processing programme.

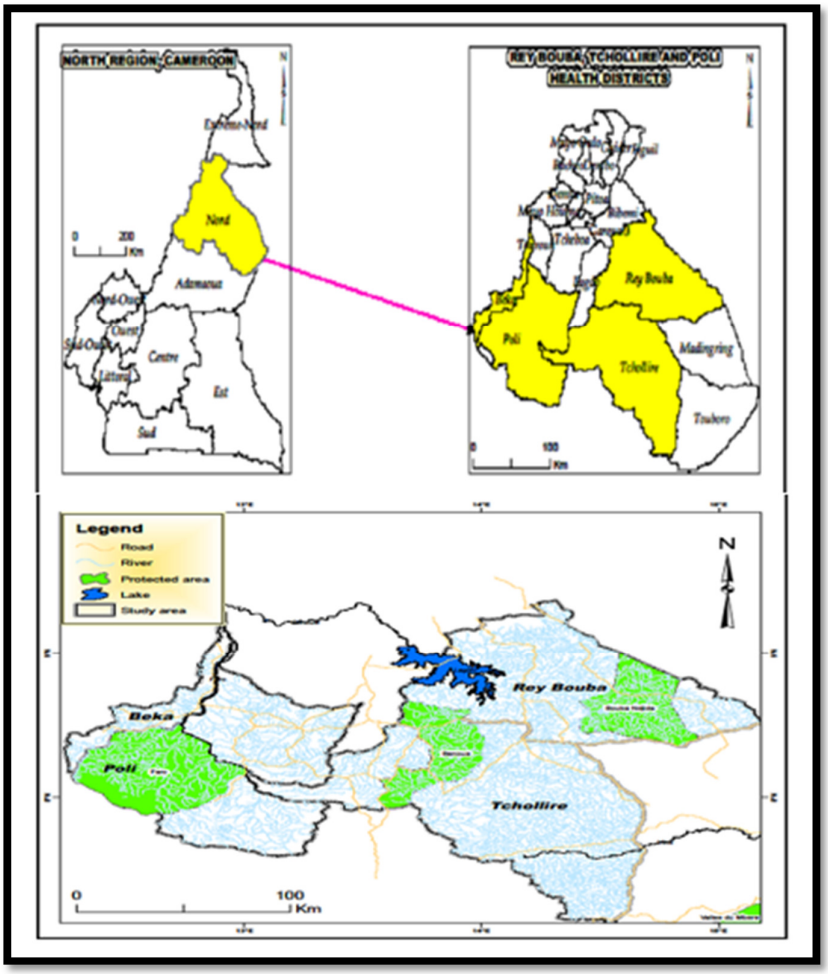

Figure 1: GPS Maps of Water Facilities in Poli, Tchollire and Rey Bouba
Source: Fieldwork

3. Results

This section presents the findings of the study. We arrived at the results herein after collating data from in-depth interviews, observations, household questionnaires, GIS and focus group discussions in Poli, Rey Bouba and Tchollire HDs. Description of these data guided us to establish grounded facts about anthropological factors favouring transmission of trachoma, respondent's perception and knowledge about trachoma, its causes and consequences, social factors, cultural factors, individual and community behaviour, hygiene and sanitation and access to water.

3.1. Perception about Trachoma

In this section, we look at the micro and macro social and individual behavioural factors promoting the transmission of trachoma. We appreciated household characteristics, hygiene and sanitation, culture, socialization, animal keeping, fly density, access to water and treatment and hand/face washing.

3.2. Hygiene & Sanitation

3.2.1. Household Cleanliness

The idea was to determine the level of environmental hygiene at the level of households in the study area. In the household questionnaires, data collected had to observe and note fly density, latrine facility, roaming animals, waste disposal, and animal/human faeces around a household. The notes were further summed and divided to give an average that determined whether a household's hygiene and sanitation situation was good, fair or poor.

3.2.2. Fly Density

According to all the key informants interviewed, the highest places where there is a high fly density in the communities are places where there are human faeces and household wastes. In addition, grazing herds were renowned and most mentioned places of high fly density, where almost all key informants cited. Animal dung was considered as a source of fly density:

In all three health districts, animal dung, human faeces, dirt, food residues and meat are the most outstanding fly pull. In general, the lack of appropriate places to dispose of household wastes helps to attract flies, therefore increasing trachoma transmission. Eating habits and how often plates are cleaned have something to do with flies. Respondents in all three health districts have the tradition of drinking tea and pap at any time of the day. Cups/plates/calabash used for this purpose. If not washed immediately, they form fly pull. Respondents acknowledge the situation and blame water scarcity as the main cause.

Figure 2: A Child in Djaba, Tchollire, with a Dirty Face
Source: Fieldwork

3.2.3. Trachoma Related Symptoms in Poli, Rey Bouba and Tchollire

Data collectors observed faces of children to establish a relationship between nasal/eye discharges and fly concentration on the face. It was noticed in Rey Bouba that 10% of children observed had either nasal/eye discharge or had fly concentration. This conclusion was later confirmed by caretakers who admitted that dirty faces attract flies and can cause a child to be sick. At Poli and Tchollire, the situation was insignificant as <2% had this problem.

Respondents concluded that the overall cause of high fly density in the community is an untidy environment and unhygienic behaviour practices but does not know if flies transmit trachoma.

4. Environmental Hygiene of the Three HDs

Environmental hygiene is one of the main components of trachoma control. Therefore, the households and the communities were targeted to assess their cleanliness through observation and interviews.

At the level of the household, we targeted environmental hygiene aspects important for trachoma control. They include fly density, latrine cleanliness/availability, roaming animals, household waste disposal and the presence of human or animal faeces within the household.

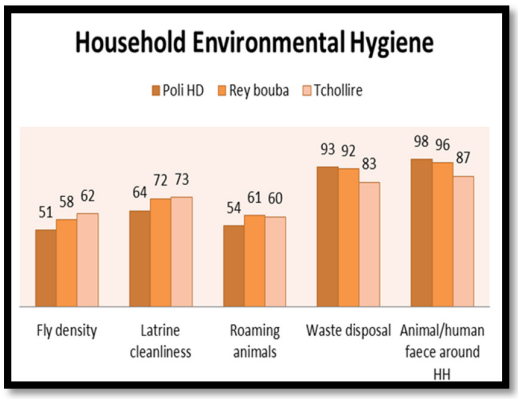

Figure 3: Environmental Hygiene Graphs
Source: Fieldwork

From the graph above, Poli had 51% of households with fly density while Rey Bouba had 58 and Tchollire had 62% of households with a high fly density.

Categories were numbered from 1 to 5 in the data and during analysis, they were categorized from the lowest to the highest quantity of the variable, for example, fly density as seen on graphs.

A question about personal and collective hygiene was asked to household respondents, keynote informants and during focus group discussions. This was to know how individuals/households and their communities go about hygiene and sanitation issues. The idea behind this was to x-ray hygiene and sanitation practices that pre-expose and favour trachoma transmission at both individual and community levels.

Compounds were observed and rated whether they have poor, fair or good hygiene and sanitation conditions. Overall results show that:

- 106 (63%) households in Rey Bouba had poor hygienic conditions, followed by Tchollire with 101 (60%) households and Poli with 61% of households.
- 28% of households in Rey Bouba had fair hygienic conditions, followed by Poli (23%) and Tchollire (17%).
- 23% of households in Tchollire had good hygienic conditions, followed by Poli (17%) and Rey Bouba (9%).

The overall results show that Tchollire has the highest number of households in hygienic conditions, followed by Poli and Rey Bouba, which has the lowest number of households in hygienic conditions.

Out of 168 households observed in Tchollire, 101(60%) had poor hygiene condition, 29(17%) were fair and 38(23%) were good. In Rey Bouba, 106 (63%) households and in Poli, 61% of households appeared unhygienic, 46 households (28%) were fair and 16 (09%) households had good hygiene situations. Tchollire and Poli had the highest number of households in good hygienic situations.

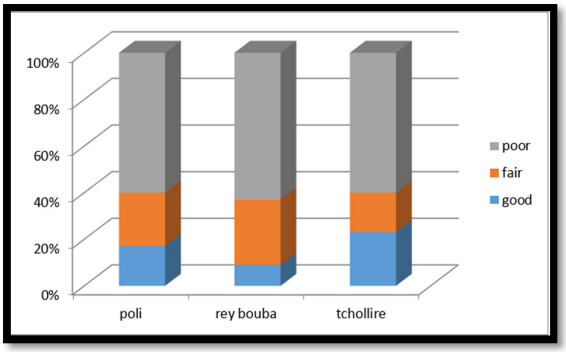

Figure 4: Level of Cleanliness in Households
Source: Fieldwork

Although the aforementioned situation is not the best, over 60% of households use soap. There is a considerable presence of community health workers (CHW) implicated in hygiene Rey Bouba (93%) compared to Poli and Tchollire. In Rey Bouba and Tchollire, CHW has gained trust from community members, whereas in Poli, less than average have trust. Be it at Poli, Rey Bouba, or Tchollire, community members are ready to mobilize for environmental hygiene in their neighbourhood.

4.1. Community-Based Wastes Disposal

There are no public waste disposal facilities and even structured solid and liquid draining systems. Community members use their backyards for the disposal of solid and liquid wastes. Some domestic wastes, such as chaff from *billi-billi (*locally made alcoholic drink*)*, attract flies in households. During focus group discussions, community leaders evoked the lack of public waste disposal places as a reason for the unclean environment. The untidiness of the communities was a course for concern for all and many were prepared to participate to upgrade the situation. Still, in focus group discussions, a few respondents perceived that a dirty environment puts all community members at risk of Trachoma, including those who maintained clean homes. As a solution, the respondent proposed the collection and burning of dirt and proper hand washing.

4.2. Latrines Facilities in the Three HDs

The availability of latrine facilities at the household level was not very satisfactory. In all, 80% of households own latrine facilities with or without slabs. The minority that does not have gave reason for lack of financial means or toilet not necessary. Unfortunately, after observing most of these toilets, they are very shallow in depth. In addition, seasonal change (rainy to dry) affects toilet possession in households at Rey Bouba and Tchollire Health Districts. At the heart of the rainy season, most toilets collapse, giving way for open-air defecation.

During an FGD in Kongrong Rey Bouba, participants said:

"We really have a problem with latrine construction here. When one constructs a toilet during the rainy season, the latrine will collapse. This means that one has to construct a toilet every year. The reason for this collapse is that our soil here is sandy, making it to be loose. Since rainfall here is too harsh, it loosens the sandy soil and sometimes one risks falling during a toilet collapse. This explains why some of us who really want to own a toilet must just dig a shallow toilet, knowing that it will collapse soon."

However, in Djouroum, a village of Rey Bouba, during an FGD, participants did not really admit that they had a similar problem with toilet construction due to sandy soil. In Tchollire, many complain that during the rainy season, water enters the latrine due to flooding and they often collapse. In addition, noise is heard during defecation "*tuum*." This annoys most of them.

Households admit they are obliged to dig new latrines every dry season, giving the reason not to bestow time and resources on toilet construction. Nevertheless, they propose that the use of durable materials can alleviate the problem. This was not the case at Poli because of its geographical topography made of hills and stones.

Figure 5: A Toilet with Walls Made of Grass in a Household in Djourong, Rey Bouba
Source: Fieldwork

The localization of the latrine in each compound is also a preoccupation. Latrines are mostly found just beside the house; in most cases, it is the smallest of all the huts and are often built with temporary material materials like grass and sticks. The toilets are very shallow and not covered. The proximity to the house makes flies leave the toilet and visit houses at random. This is a potential source of trachoma and related disease transmission.

The manner in which the toilet is shared in the household was our preoccupation as well. From focus group discussions, participants said:

"In a polygamous home, there is usually more than one latrine, meaning that the number of toilets corresponds to the number of co-wives. Each wife and children have their own toilet. In a case where the man has just one wife, the man jointly uses just one toilet with the wife."

Although the percentage of those who have toilet facilities at home seems to be less impressive, the issue of toilet ownership is still a preoccupation in many communities in the Northern Region of Cameroon and, particularly, in the study areas. During a FGD, it was said that certain ethnic groups do not have a culture of toilet use. An example of such people is the Tupuri found in the Far North and the Northern Regions of Cameroon. It was observed that in communities where they are dominant in Guidjiba of the Tchollire health district, for example, toilet facilities were very scarce. Rather, the nearby bush had littered faeces already dried up due to the dry season heat. When asked why they behave as such, they simply said it is their culture. Some said they could not be spending time or money to construct toilets when bushes are around. The nearness of latrines to houses and the odour make some family members to go and ease themselves into the open air where they feel relaxed.

In another FGD at Konrong, Rey Bouba, participants reveal the resistance of some to construct toilets. As they said:

"There was a time when sanitation controllers were to come and check on toilet facilities with subsequent sanctions to those who did not own latrines; there were people who built a small hut and put sticks on top just to blindfold the vigilance of the controller. When they came, they would just see that, thinking it was a latrine, whereas it was not. Some people prefer the bush."

Conclusively, people said they do not use latrines in the study areas because of the odour of the latrines and due to the presence of water in the pit toilet. The very close proximity of toilets to residents makes some family members prefer going to far bushes for defecation.

"We really have a problem with toilet construction here. When one constructs a toilet during the rainy season, the toilet will collapse. This means that one has to construct a toilet every year. The reason for this collapse is that our soil here is sandy, making it to be loose. Since rainfall here is too harsh, it loosens the sandy soil and sometimes one risks falling during a latrine collapse. This explains why some of us who really want to own a toilet must just dig a shallow toilet, knowing that it will collapse soon."

"There was a time when sanitation controllers were to come and check on toilet facilities with subsequent sanctions to those who did not own toilets; there were people who built a small hut and put sticks on top just to blindfold the vigilance of the controller. When they came, they would just see that, thinking it was a toilet, whereas it was not. Some people prefer the bush."

Figure 6: A Woman Serving Water to Her Son to Wash Hands before Meal at Tapare, Poli

The kettle is used for two main purposes in the North Region and specifically in the studied areas. *One* of the uses is to clean the anus after defecation and the other is to clean up for prayer in the Muslim communities.

The use of the kettle (*buttah* in Fulfulde) for anal cleaning after excreting was recurrent in all health districts. Over 97% of individuals use the kettle with water. No difference was made between various religious groups at the level of households. Respondents say there is always water in the "*Buttah"* for toilet use.

4.3. Animal Loitering in the Community

Figure 7: Strayed Animals in Djaba Community, Tchollire

Some cultural practices observed cause individuals and communities to be vulnerable to contracting trachoma. During this study, all households kept domestic animals. Animals are let loose during the dry season after harvesting farm products. They are confined during the farming season. The reasons for community members to keep animals nearer their houses are:

- Source of income in case of problems to be protected against thieves. Source of dairy products (milk, butter and meat)
- Production factors in agricultural activities Use for cultural practices (rites, religions and tradition)

These above-mentioned reasons explain why families live in close proximity to animals in enclosed fences. The cultural practices increase animal litter around households and potential sites for fly concentration, thereby promoting trachoma transmission. From in-depth interviews, respondents said there is a bond between the people of the studied areas and their animals. They even went further to say that the relationship between domestic animals is like that between a father and a son. This makes it difficult to keep them far from them, especially if their safety is threatened.

5. Discussion and Conclusion

The following findings emerged from the data. In all three health districts, all community members live in a compound with many people and houses inside. Compounds are so close to each other in such a way that there is much mingling, which is a favourable environment for trachoma transmission. Animal rearing is a general aspect in all compounds when animals live in the same compound with people. This concentration of animals in the compound leads to the concentration of animal dung that attracts flies, of which the one that causes trachoma can be present.

Community aspects that were identified were the lack of enough water facilities, waste disposal facilities, and fly density, just to name a few. The scarcity of water due to the absence or non-maintenance of water infrastructures was a barrier identified in all three health districts. Many boreholes were at the breakdown stage due to lack of funds, spare parts and adequate water management committees. The sanitation situations of most of the communities were bad because of animal loitering and dung could be found everywhere. This attracted flies a lot.

Individual behaviours observed in the community show that people do not keep hygiene and sanitation rules. Children's faces were often not clean throughout the day. The presence of animal dung around them did not mean anything. Wastes disposal was done around the compound on the ground, not in the trash.

From our findings, in Rey Bouba, 10% of children observed had either nasal/eye discharge or fly concentration. Caretakers who admitted that dirty faces (regarding nasal and eye discharge) attract flies later confirmed this conclusion. At Poli and Tchollire, the situation was <2% (less than two percent).

Risk perception of trachoma infection was low in the community. Even among the community leaders, who were mostly our key informants, perceived trachoma causation to contaminated objects. Dirtiness was also a major cause of trachoma, but this was more speculative, for they mistook trachoma for so many diseases known to them. Insect bites were also a risk perceived to trachoma, proving the fact that they also mistook trachoma for onchocerciasis. The research shows the perceptions of trachoma by the three studied HDs.

6. References

i. Edwards, T., Cumberland, P., Hailu, G., & Todd, J. (2006). Impact of health education on active Trachoma in hyperendemic rural communities in Ethiopia. Ophthalmology, 113(4), 548–555.
ii. Emerson, P. M. (2010). Estimation of effects of community intervention with Antibiotics, Facial cleanliness, and Environmental improvement (A, F, E) in five districts of Ethiopia hyperendemic for Trachoma. British Journal of Ophthalmology, 94(3), 278–281.
iii. Emerson, P. M., Burton, M., Solomon, A. W., Bailey, R., & Mabey, D. (2006). The SAFE strategy for Trachoma control: using operational research for policy, planning, and implementation. Bulletin of the World Health Organization, 84(8), 613–619.
iv. H, Russel Bernard (1988). Research Methods in Cultural Anthropology.
v. Kelley Cosby Sams (2013, January). The Elimination of Blindness: An Ethnographic.
vi. Khandekar, R., Thanah, T. T. K., & Thi, P. D. (2006). Impact of Face Washing and Environmental Improvement on Reduction of Active Trachoma in Vietnam – A Public Health Intervention Study. Ophthalmic epidemiology, 13(1), 43–52.
vii. Mariotti, S. and Pruiss, A. (2001). The SAFE Strategy. Preventing Trachoma: A Guide for Environmental Sanitation and Improved Hygiene. World Health Organization, Geneva.
viii. Ngondi, J., Gebre, T., Shargie, E. B., Adamu, L., Teferi, T., Zerihun, M., ... & Ngondi, J., Matthews, F., Reacher, M., Baba, S., Brayne, C., & Emerson, P. (2008). Associations between active Trachoma and community intervention with Antibiotics, Facial cleanliness, and Environmental improvement (A, F, E). PLoS Neglected Tropical Diseases, 2(4), e229.
ix. Patton, M.Q. (2002). Qualitative Research and Evaluation Methods. 3rd ed. Thousand Oaks, CA: Sage Publications.
x. Polack, S., Kuper, H., Solomon, A. W., Massae, P. A., Abuelo, C., Cameron, Professor Clare Gilbert (2013). Research to inform the development of behavior change interventions for the "F" and "E" of the SAFE strategy in Turkana and Marsabit, Kenya.
xi. Rabiu, M., Alhassan, M. B., Ejere, H. O., & Evans, J. R. (2012). Environmental sanitary interventions for preventing active Trachoma. Cochrane Database Syst Rev, 15(2).
xii. Rog, M., Swenor, B., Cajas-Monson, L. C., Mchiwe, W., Kiboko, S., Mkocha, H., & West, S. (2011). A cross-sectional survey of water and clean faces in Trachoma endemic communities in Tanzania. BMC Public Health, 11(1), 495.
xiii. Rubinstein, R. A., D. Lane, S., Sallam, S. A., Sheta, A. S., Gad, Z. M., Sherif, A. R., ... & Dawson, C. R. (2006). Controlling blinding Trachoma in the Egyptian Delta: Integrating clinical, epidemiological and anthropological understandings. Anthropology and medicine, 13(2), 99–118.
xiv. Sightsavers (2011). Elimination Blinding Trachoma, a ten-year strategic plan in 24 countries.
xv. Sightsavers (2015, April). Situational Analysis for the Trachoma Elimination.
xvi. Sightsavers (April 2013). Washing away blinding trachoma.
xvii. Stoller, N. E., Gebre, T., Ayele, B., Zerihun, M., Assefa, Y., Habte, D.,... & Emerson, P. M. (2011). Efficacy of latrine promotion on the emergence of infection with ocular Chlamydia Trachomatis after mass antibiotic treatment: a cluster-randomized trial. International health, 3(2), 75–84.
xviii. WHO (2006). Lutte contre le trachome: un guide pour les gestionnaires de programme.