International Journal of Rural Development, Environment and Health Research (IJREH)
ISSN: 2456-8678
[Vol-5, Issue-3, May-Jun, 2021]
Issue DOI: https://dx.doi.org/10.22161/ijreh.5.3
Article DOI: https://dx.doi.org/10.22161/ijreh.5.3.4

Socio-environmental Vulnerabilities and the Recurrence of Dracunculiasis in Rural Area of Chad

Jacob Mbaihondoum[1], Yves Bertrand Djouda Feudjio[1], Nathalie Lando Loyem[2], Tchindebet Ouakou[3], Jean Nzhié Engono[1]

[1] University of Yaoundé I, Department of Sociology, Cameroon
[2] University of Dschang, Department of rural Socio-Economic and Agricultural Extension, Cameroon
[3] National Guinea Worm Eradication Program, Chad

Received: 15 Mar 2021; Received in revised form: 25 Apr 2021; Accepted: 09 May 2021; Available online: 27 May 2021

Abstract— *The issue of waterborne diseases, which has been at the center of scientific debate for several decades, is still relevant, especially in low-income countries. This paper garners sociological approaches to understand and explain the relationship between socio-environmental vulnerabilities, water management and the consequences of Dracunculiasis / Guinea worm disease in rural area of Chad. Data were collected from November 2019 to January 2020 in five (5) departments, namely: Aboudéia, Barh kôh Lac Iro, Loug-chari and Mayo Lémié. The following survey techniques were used: qualitative and quantitative, with instruments such as questionnaire, interviews, life stories and direct observations. SPSS version 25 software was used to process the quantitative data (n = 769). For the qualitative data (n = 50), data collected through the dictaphone was transcribed then analysed using content analysis. The study used the theory of social representations (Jodelet, 1989) to analyse the phenomenon. The results indicate that 90.51% of respondents in the endemic areas were aware of the Guinea worm disease. 64.29% of respondents stated that they did not have access to potable water. The results also indicate that 84.00% of respondents travel more than 10 km to access health facilities. The eradication of Dracunculiasis is fraught with multiple vulnerabilities, including economic, environmental, educational, and health-related, which the rural communities affected by this endemic face. In addition to these bottlenecks observed at the community level, institutional difficulties have also been noted, such as the unsmooth implementation of the multisectoral approach and the inefficiency of awareness-raising strategies. The disseminated of information by agents deployed in the field does not have a considerable impact. All these factors have contributed to the recurrence of Dracunculiasis/Guinea worm disease in several villages.*

Keywords— ***Socio-environmental vulnerabilities, recurrence, Dracunculiasis, rural area.***

Résumé **-** *La problématique des maladies hydriques, au centre des réflexions scientifiques depuis plusieurs décennies, reste toujours d'actualité, notamment dans les pays à revenu faible. Le présent article mobilise les approches sociologiques pour comprendre et expliquer le rapport entre vulnérabilités socio-environnementales, la gestion de l'eau et l'incidence de la dracunculose / ver de Guinée en milieu rural tchadien. Les données ont été collectées de novembre 2019 à Janvier 2020 dans cinq (05) départements à savoir : Aboudéia, Barh kôh Lac Iro, Loug-chari et Mayo Lémié. Les techniques d'enquête suivantes ont été utilisées : qualitative et quantitative, avec les instruments tels que : le questionnaire, les entretiens, les récits de vie et les observations directes. Le logiciel SPSS version 25 a été utilisé pour traiter les données quantitatives (n = 769). Pour le volet qualitatif (n = 50), les données collectées à travers le dictaphone ont été retranscrites ensuite analysées grâce à l'analyse de contenu. L'étude a fait recours à la théorie des représentations sociales (Jodelet, 1989) afin d'analyser le phénomène. Les résultats indiquent que 90,51%*

des personnes enquêtées dans les zones endémiques connaissent la maladie du ver de Guinée. 64,29% des enquêtés ont déclaré qu'ils n'ont pas accès à l'eau potable. Les résultats indiquent également que 84,00 % des enquêtés parcourent plus de 10 km pour se rendre dans les structures sanitaires. La lutte contre la dracunculose est émaillée des vulnérabilités plurielles entre autres économiques, environnementales, éducatives, sanitaires auxquelles font face les communautés rurales victimes de cette endémie. Au-delà de ces goulots d'étranglement observés au niveau communautaire, il est également noté des difficultés d'ordre institutionnel à savoir les dysfonctionnements dans la mise en œuvre de l'approche multisectorielle mais aussi l'inefficacité des stratégies de sensibilisations. Les informations vulgarisées par les agents déployés sur le terrain n'ont pas d'impact considérable. Tous ces facteurs ont favorisé la recrudescence de la dracunculose / ver de Guinée dans plusieurs villages.

Mots clés*— *Vulnérabilités socio-environnementales, recrudescence, dracunculose, milieu rural.

I. INTRODUCTION

The relationships between socio-economic and environmental vulnerabilities, access to water and the effect of Guinea worm disease has so far been poorly understood in rural Chad. The Guinea worm disease which is a disease that affects communities living in poverty is exclusively transmitted by drinking water that has been contaminated by the larva of the parasite. It mainly affects people living in rural areas with no access to potable water and has many significant socio-economic consequences (WHO, 1996; 2010). Several countries, notably Benin (2008), Burkina-Faso (2011), Togo (2012), Niger (2014) and Ivory Coast (2014) have succeeded in eradicating Dracunculiasis thanks to simple and effective preventive measures. (WHO, 1998). However, in Chad, Dracunculiasis continues to claim victims including animals (dogs, cats) in the transmission chain. Multiple vulnerabilities, such as the lack of drinking water, inaccessibility to health facilities, and the non-existence and/or scarcity of educational centers are factors that significantly compound the eradication of Dracunculiasis in rural Chad. Indeed, strategies have been developed by international and national institutions (WHO, CARTER Center, UNICEF, PNEVG...) to eradicate the Guinea worm in Chad, (WHO, 2015).

In 2010, there was a recurrence of Dracunculiasis in Nanguigoto, in the department of Mayo Lémié; cases were subsequently observed in several villages. In 2016, 16 human beings and more than 1,000 dogs were infected. The unusual, potentially new mode of transmission between humans and animals observed since 2012 was the same in 2016, (WHO, 2018). It is seen through the sporadic and scattered occurrence of human cases from different villages each year. The increase in infections among dogs is still recorded along the Chari River basin, which is now considered a danger zone. The number of dracunculiasis infections recorded in dogs has continued to increase in rural Chad. In 2012, the number of infections increased from 27 to 55 in 2013. In 2014, it increased from113 cases to 503 and 1011 in 2016. In 2018, it increased from 1040 to 1935 animal infections in 2019. Yet, 47 human cases were recorded in 2019. Faced with this new cases and infections observed, the following question can be asked : what accounts for the recurrence of the Guinea worm despite the various institutional and community interventions? This sociological contribution sheds more light on the multiple factors that impede the eradication of the Guinea worm disease in Chad. The purpose of this paper is to provide an in-depth analysis of the socio-environmental vulnerabilities of rural communities in relation to the recurrence of the Guinea worm disease in endemic villages.

II. METHODOLOGY

The sample population includes five (5) departments in Chad, all of which are Guinea worm endemic, namely: Aboudéia, Barh kôh Lac Iro, Loug-chari and Mayo Lémié. It should be noted that these departments were chosen based on their vulnerability to the disease. The population of the target area is 856.932 inhabitants according to the 2009 general population census. The study focused on people of both sexes between the ages of eighteen (18) and fifty (50). The choice of this age group is explained by the fact that these people are likely to provide evidence regarding the problem addressed, especially the relationships between socio-environmental vulnerabilities and the recurrence of Dracunculiasis in rural areas in Chad. The study used a mixed-methods approach. For the qualitative component, data were obtained from 50 semi-structured in-depth individual interviews conducted from November 2019 to January 2020 using a dictaphone. For the quantitative component, a questionnaire was administered in 769 households in Guinea worm endemic villages. The questionnaire was used to identify important aspects of the topic such as community awareness of the Guinea worm disease, access to water and health facilities, information channels, and awareness-raising actors. Targeted and repeated

observations in the field revealed institutional dysfunctions, such as the non-implementation of the multisectoral approach, which is considered a strategy for eradicating Dracunculiasis by the Chadian government. It should be noted that field data collection took into account the requirements of free participation, confidentiality and anonymity. Cultural aspects and privacies were taken into account and respected. The interviews were transcribed and analysed using content analysis. SPSS version 25 software was used to process quantitative data. In order to define the scope of the study, the social representation theory (Jodelet, 1989) and the Health Belief Model (Rosenstock, 1974) were used to understand the social constructs developed by rural communities around the Guinea worm disease.

III. RESULTS

Response strategies against Dracunculiasis in rural of Chad

In an effort to reverse the serious socio-economic consequences of the Guinea worm disease in rural areas, the World Health Organization [WHO] has set the goal of eradicating the disease worldwide. At the behest of the WHO, Chad, as an endemic country, developed a program in 1991 in which it proposed to eradicate the disease from the entire national territory. It should be noted that this program, which was implemented by Chad in collaboration with the WHO, made it possible to obtain a national map of endemic areas. In 1992, a pilot survey was conducted, and between 1993 and 1994, a national survey was conducted by the program. Finally, additional surveys were conducted in 1995. The main strategies and interventions that were implemented to achieve the goal were : community-based epidemiological monitoring, the isolation or containment of cases, vector control based on the treatment of ponds and wells, water filtration using filter cloth, the supply potable water to endemic villages, information-education and communication, social mobilization, supervision, the burial of casings, reward system, monitoring-evaluation, etc. In order to carry out its activities on the ground, the program has focused on a multisectoral approach by including some state institutions such as the Ministry of the Interior, Education, Livestock, Water, Environment and Fisheries Resources, as well as social action in the struggle. Multi-faceted support was provided by international institutions (CARTER Center, UNICEF, WHO, etc.) so as to assist Chad in the process of eradicating Dracunculiasis (CARTER Center, 2019). The program also includes village health workers and community leaders in Guinea worm campaign. They are considered real partners of the program as a program officer highlighted during the interview.

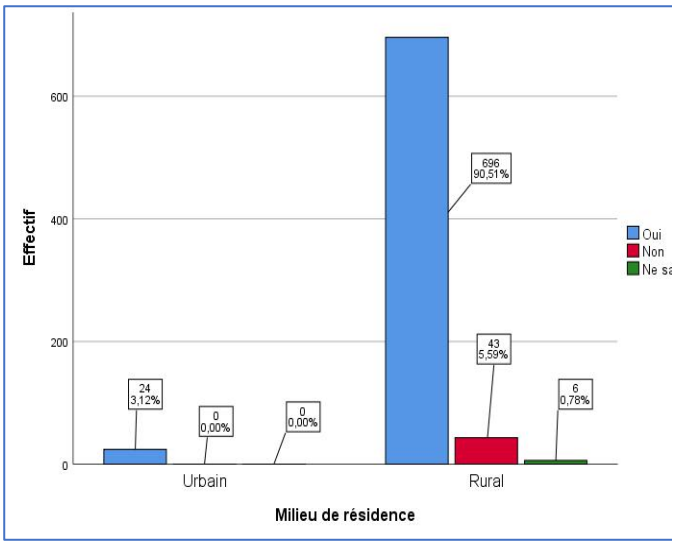
> "The endemic community is also a partner that should not be neglected because Guinea worm disease monitoring is community-based, so it is the community members who help us to conduct monitoring in their own village on a daily basis. They are the ones who notify us of dogs' infections and rumours' from people. We consider them to be full-fledged members of the community". (Interview conducted on 05/11/2019 in N'Djamena)

These various institutional and community interventions have enabled the program to adopt several channels for raising awareness in rural communities.

Information channels and awareness raising messages

The programme, which depends on Village Health Workers (VHWs) to facilitate Guinea worm control activities, is based on the fact that, "communities can improve their health when they are aware of its existence, when they have tools, skills and technical support to implement sustainable low-cost interventions" (MSP, 2014). Or, "those mostly exposed to the degradation of the socio-economic environment are able to analyse their own problems and participate in the research and implementation of new practices," (N'détibaye, 2004). This is where the concept of community participation derives its full meaning. Indeed, in order to reach a large number of people likely to relay information on Guinea worm eradication, the program has decided to raise awareness in public places such as markets, schools, religious places, and recreational areas since they are the best venues for the dissemination of Guinea worm eradication messages. Channels such as radio spots, video clips, posters, television, theatre and songs are used to reach out to a good number of rural populations. The main messages focus on the awareness of the Guinea worm, its causes, signs and symptoms, transmission mode and its consequences, the reward system, and casing burial. These key messages contribute to the eradication of Guinea worm disease. The strategies devised by the program have enabled communities in endemic areas to have a broad knowledge of Dracunculiasis as shown on the histogram below.

Histogram 1: Respondents distribution according to the awareness of Guinea worm disease by place of residence



According to histogram 1 above, 90.51% of the respondents said they were aware of the Guinea worm disease. This proves that the information on the awareness of Guinea worm disease disseminated through several channels has reached a large part of the population. However, there is a crucial problem because, despite the awareness of the disease, practices that do not favour the eradication of the Guinea worm disease are still observed due to the multiple vulnerabilities faced by rural communities.

Multiple vulnerabilities and the recurrence of Dracunculiasis cases

The concept of vulnerability is therefore sociologically complex, deep, dynamic, multidimensional, relative and temporal. For example, on the one hand, one may be vulnerable to the extent that one is subject to a risk while others are not; on the other hand, situations of vulnerability may be subject to time and space, including ecological, historical, economic, cultural, and political contexts, (RECSO, 2019). Indeed, vulnerability refers to the existence and extent of poverty and misery threat, the danger that a socially unacceptable level of well-being will be reached, (Stefan Dercon, cited in Marie Bar and al. 2011). According to Aboussad and al. (2010), vulnerable individuals are those whose autonomy, dignity, or, physical or psychological integrity, is threatened. The author adds that this vulnerability can be as a result of many factors, often combined, such as age, illness, infirmity, physical or psychological disability or pregnancy, with socio-economic contexts that can be very different. Often considered as a disease for the poor, Guinea worm is becoming more prevalent in rural Chad with animals in the transmission chain due to the multiple vulnerabilities faced by rural populations. This paper has attempted to examine, based on field data, the different types of vulnerabilities (health structures vulnerabilities; educational structures vulnerabilities; and economic vulnerabilities) that not only impair the control of Guinea worm, but also contribute to the increase in cases and infections in endemic areas.

Water access issues in endemic villages

If water is an indispensable resource for human life, then it also contributes to economic development and guarantees the happiness of populations. Statistics at the international level show that, nearly one billion people in the world cannot access potable water (Mabé, 2016). Indeed, water scarcity occurs when the demand for water exceeds the quantity available during a period of time or when its poor quality leads to waterborne disease. Chad faces potable water crisis in rural areas. According to the World Bank report (2019), less than one in two children in Chad has access to potable water, only one in 10 children has access to basic sanitation, and only one in 17 children wash their hands with soap and water. But the real tragedy is the impact of this water crisis on the daily lives of poor people, who suffer from water-born [Guinea worm] diseases, live in degraded and often dangerous environments (Diatta, 2015). "Disease of the empty granary", "disease of communities living in poverty", "humiliating disease", "disabling disease", "disease of shame" ... these are the terms used to refer to the so-called "Guinea worm" disease or Dracunculiasis. In Chad, several factors and vulnerabilities contribute to the increase of Guinea worm cases in rural areas. While the eradication of the Guinea worm disease aims at promoting the consumption of clean water, communities living in rural Chad do not have access to this "blue gold. In some endemic villages such as Bogam, Dangalakanyan and Djoballa, there are no drinking water spots. The human and animal populations (domestic and wild) scramble to the few available water spots s (ponds and rivers), which look polluted, thus being potential sources of disease. In this survival of the fittest, the scarcity of this natural resource, namely water, does not allow them to respect the instructions of the Dracunculiasis awareness raising agents. During the interview, one respondent stated that :

> "Guinea worm disease is resistant in Chad because we are poor; we have no strength [means] so we are forced to

> drink water from 'Bouda' [ponds]. If we have taps everywhere it will help us. If you are in the farm ploughing, sometimes you find water from "Bouda" [ponds] you drink and even on the road, if you find water you drink. Our country has no other means, so let them [the donors] help us with potable water and if the guinea worm continues to rage we will try to find other solutions. Otherwise we don't have any other potable water in Chad. We are still poor". (Interview conducted on 24 /11/2019 in Bâ-illi)

Photo 1: Water from a pond drank in a rural area in Bogam

The picture above perfectly illustrates the difficulties of accessing water in the majority of villages endemic to Dracunculiasis. The few polluted water sources are used daily in households.

At the legal and institutional level, several texts and laws have been adopted by Chad, namely, the water code, law no.016/PR/99, promulgated on August 18, 1999, on the sector's orientation and management law, as well as the Water and Sanitation Master Plan (SDEA), adopted in April 2003. This plan is a strategic and multisectoral framework for the sustainable development and management of Chad's water resources in order to meet the basic needs of the population and ensure the country's economic and social development, while respecting the environment. In addition, Chad is a member of the Lake Chad Basin Commission for the management of transboundary waters (SDEA, 2003). The implementation of these texts and laws could enable Chad to satisfy the population's potable water needs, but the opposite is observed in rural areas. In a report highlighting the coordination between the Neglected Tropical Diseases and WASH sectors published by the Bureau d'Expertise d'Eau-d'Assainissement de Développement et Ingénierie Sociale in December 2020, the lack of collaboration between these two sectors is mentioned :

> It is noted that there is no coordination between the MTN programs and the WASH sectors in Chad. However, several meetings and discussions have taken place between the MTN coordinators, the ministry in charge of water and sanitation and UNICEF for advocacy purposes to direct the boreholes and WASH programs in their MTN service, but this has not led to any solution. In addition, the MTN coordinators decry the fact that WASH actors do not take into account MTN indicators and areas of high MTN morbidity prevalence in their actions. The lack of coordination and discussions between the NTM programs and the WASH sector should be highlighted.

Communities' living in Dracunculiasis endemic areas do not know what clean water looks like. Breakdowns and other technical problems prevent the normal functioning of some of the human-powered pumps and water towers installed in some endemic villages, as illustrated in the picture below.

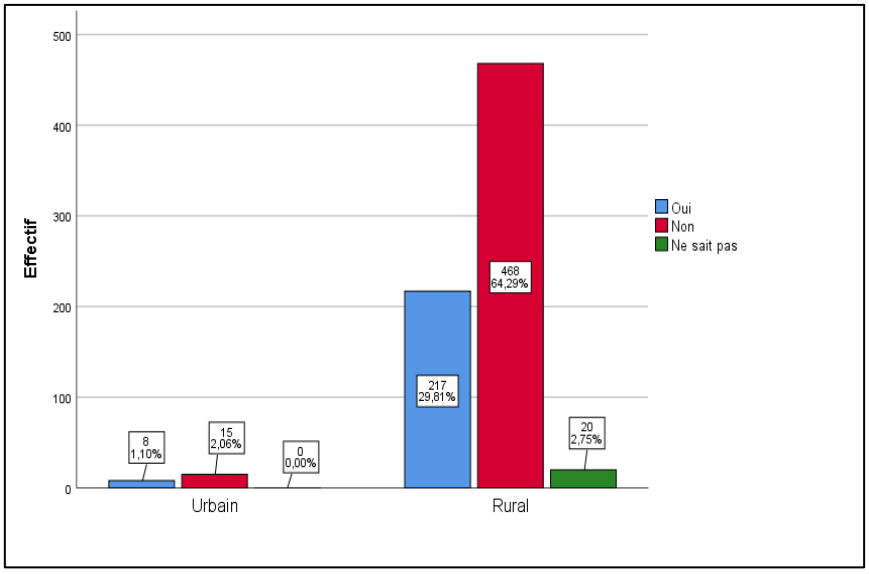
Picture 2: Human-powered pump and water tower out of order in Liwi and Kyabé

Human powered pump in Kyabé

Castle in Liwi

The images above illustrate the difficulties of accessing water encountered by populations living in Dracunculiasis endemic areas. Indeed, a few times spent in the endemic villages allowed us to observe the ordeal of the populations in terms of access to drinking water. The boreholes and water towers installed to relieve the rural communities are out of order, leaving the populations in desolation and in an obvious sanitary vulnerability.

Histogram 2: Respondents distribution according to access to sufficient drinking water in Dracunculiasis endemic areas



Access to water is mainly a problem or a real chore for rural households who sometimes have to walk thirty minutes or more to reach the nearest water point. This was observed in Bogam when the inhabitants have to fetch water from ponds such as "Birka Bogam", "Kokoro" and "Rasalfil" which supply a village of 98 households. The consumption of this pond water by the population resulted in the development of Guinea worm disease for the first time in this village, which was a new to Guinea worm control agent. Indeed, the village of Bogam was not among the villages under active monitoring by the program's agents. It was following the development of Guinea worm disease in 23 people due to the consumption of pond water that the program deployed agents to this area.

According to the above data, 64.29% of respondents stated that they do not have access to sufficient drinking water. This can be explained by the inadequacy and absence of water points in the endemic villages on the one hand, and the repeated breakdowns of boreholes on the other. Poor water quality, lack of hygiene, malnutrition, and even nutritional deficiencies increase morbidity and mortality in humans (Lysaniuk & Tabeaud, 2015). These different

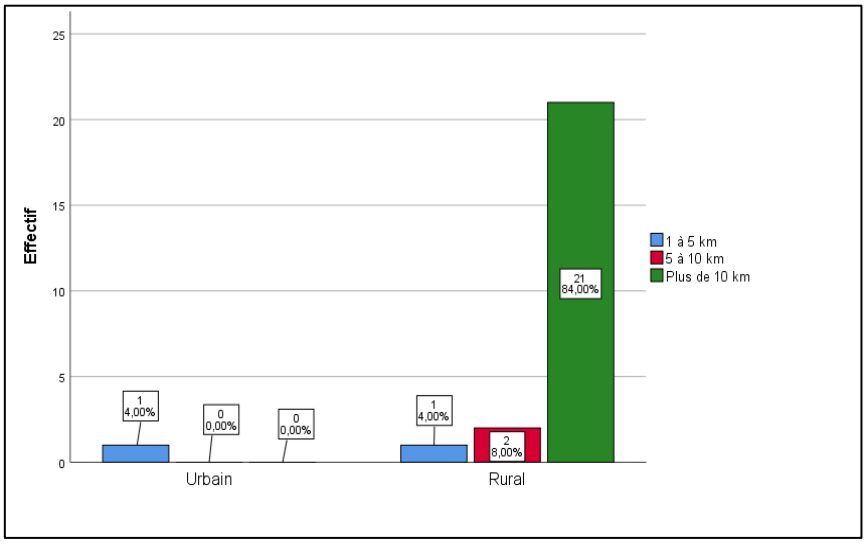
vulnerabilities are intertwined and thus create the phenomenon of co-vulnerability among rural households.

Geographical and social accessibility of Dracunculiasis endemic villages to health structures

Access to health care is an important dimension of the eradication of the disease, as health services are supposed to play a role of supervision, therapeutic follow-up, healing and even prevention. However, according to documentary and field observations, this access is often subject to several constraints, including geographic accessibility (Ndonky and al., 2015). Accessibility includes the location of the health service offer available in a given territory or area and the distance (or travel time) required to get there. (Olvera and al., 2011). Indeed, the majority of rural areas where Guinea worm is prevalent face geographic accessibility to health facilities issues. Sick people must travel a long distance to reach a health center with all the risks that this entails. Geographical accessibility issues are not easy to address in rural areas where the main means of transportation are on foot, bicycle, motorcycle and camel/ox. With these limited means of transportation, it is not possible for a person in a critical situation to quickly reach the health care center, (Djouda & Leumaleu-Noubissie, 2019).

During the field survey, it was also observed that health centers lacked qualified staff (case of the health center of Oulboye /Kyabé; health center of Moursal / Bâ-illi), In addition, a few more or less educated volunteers worked in the place of qualified personnel. When looking at the health centers and training in general, it appears that the technical platform has many problems related to deterioration or obsolescence and the lack of qualified personnel, (Mouliom & Batibonak, 2018). There is also a lack of necessary medicines, the technical platform as a whole does not allow for the provision of first aid in most of the villages visited leaving the rural populations in vulnerability despite the international treaties and agreements on health approved by Chad including Alma Ata (1978), Ottawa (1986) and Bamako (1987) etc. To reach the nearest health center, one has to travel 10 to 15 km, on unpaved tracks due to mud and dust (Djouda & Leumaleu-Noubissie, 2019). This situation is observed in the majority of the endemic villages surveyed. The best supply [of care] remains concentrated in urban areas and particularly in large cities within which the inability to access health facilities is theoretically multiplied by the diversity of the supply of health services, (Olvera and al., 2011).

Histogram 3: Respondents distribution by distance travelled in Dracunculiasis endemic areas to reach health centers



According to the respondents, the distance travelled to reach the health centers in rural areas is an obstacle to the treatment of their illness. According to the data from the field, 84% of respondents stated that they travel more than 10 km to reach health facilities. The difficulties related to transport and distance are likely to encourage not only the practice of self-medication but also the use of traditional medicine or even the "new soul savers" in isolated areas. The difficult access to health centers has a considerable impact on the treatment of patients. In spite of the difficult access to health facilities that rural communities face, other significant factors, notably the lack of educational facilities, add to their suffering.

The difficult access to educational centers in Dracunculiasis endemic villages

Access to education for all was hammered through numerous United Nations conferences such as the "World Declaration on Education for All" in 1990 and the "Dakar

Framework for Action" in 2000. The 2030 Sustainable Development Goals include access to quality education, ensuring that all people have access to education and promoting equitable quality learning opportunities throughout life (UNICEF, 2015). Indeed, the application of the instructions for the eradication of Guinea worm relayed by village health workers through awareness-raising would be beneficial if rural populations are educated. However, it was found that most people living in endemic areas do not have the level of education required to understand the importance of being informed of the Guinea worm. There are no educational centers in most of the villages affected by Guinea worm. Some information brought by the program team in the field does not have a considerable impact because of mass illiteracy. In this regard, the analysis made by Mbaihondoum (2016) corroborates this idea. In a study conducted on the use of tractors in East Tandjilee, the author found and revealed that the majority of farmers cannot read or write. In the absence of an acceptable level of education, they find it difficult to keep with the technical itinerary. In rural areas of Chad, many households are still not enrolled in school, which makes it more difficult for them to access awareness-raising programs that are being disseminated.

Consequences of Dracunculiasis on rural populations

Although the disease is rarely fatal, Dracunculiasis is nevertheless a serious public health problem. It also constitutes a major obstacle to the socio-economic development of endemic rural communities because of the long period of total but temporary disability suffered by the sick (WHO, 1998). In countries [Chad] where the disease is prevalent, the economic consequences are a heavy burden for the affected rural populations. According to the WHO (2012), the cost of low school attendance and income loss for individuals and the community can be very high. Indeed, the pain due to this is sometimes so intense that those affected are forced to abandon their daily activities. The disease greatly disrupts household life, as mothers are unable to care for their children, prepare meals, and take care of the house Infected men and women can no longer work in the farm and will have nothing to harvest at the end of the growing season. The Dogon people of Mali refer to the infection as "empty granary disease," (Aboubacar, 2004). During the period when Guinea worm is most prevalent, many children are affected and are unable to attend school.

The rate of absenteeism in primary and secondary schools is very high. This problem is sometimes so severe that some schools have to close for the whole year because of a lack of able-bodied students. Other serious infections often occur in addition to Guinea worm disease. When the blister ruptures, a wound that is often exposed to contamination by various germs is formed. If tetanus infection or severe sepsis occurs, the affected person may become disabled or even die. The economic consequences of Dracunculiasis, according to Chippaux and al (1992), are difficult to assess because a large part of household income is still in food products with a less representative commercial value which does not take the working time in account. It is customary to say that "health has no price" (Mouliom & Batibonak, 2018), but "the Guinea worm has taken everything" because, when dogs infected with Guinea worm are tied for a long time, it favors and increases the theft of livestock in certain endemic villages, as confirmed by this respondent:

> "In some endemic villages where infected dogs are tied, hyenas have taken many goats from the people, while thieves take advantage of this opportunity to steal cattle and other material goods in rural areas". (Interview conducted on 15 /11/2019 in Bousso)

IV. DISCUSSION

The objective of this script was to analyse the socio-environmental vulnerabilities related to the prevalence of Dracunculiasis in Chad. The data analysed showed that the eradication of the Guinea worm disease in rural Chad is fraught with economic, environmental, educational and health challenges, thus increasing the number of cases and infections in endemic areas. The issue of access to potable water remains a major challenge for the National Guinea Worm Eradication Program. These results corroborate those of Mabé (2016), who states that, in Africa, despite all the efforts made over the past several decades, even the most water-rich countries have not yet managed to tap their hydrological potential in order to ensure an adequate supply of water to their populations. To face this challenge and to address the issue of potable water supply, a new sustainable management policy is absolutely imperative. In addition to these difficulties observed at the community level, there are institutional problems, notably the unsmooth implementation of the multisectoral approach and the ineffectiveness of the strategies implemented to raise awareness. As a result, communities are "poorly structured", "poorly informed" and "poorly sensitized" (Djouda, 2018). From what we got from the field :

> "At the beginning of the program, we trained quite a few health agents on

> monitoring activities especially in endemic areas, but when you come for supervision six months later, you find new ones. We have moved all these agents that you have trained elsewhere, sometimes in areas that are not Guinea worm disease endemic, and this is somewhat problematic". (Interview conducted on 05/11/2019 in N'Djamena)

Regarding these institutional failures, conclusions arrived at by Tesser and al (2004, 102) in a study conducted on the state's responses: "Too often, stakeholders put up with providing some information on health issues, assuming that this will be enough to change behaviour. Whereas it is not the case".

According to Hours (2001), the health situation in so-called developing countries is usually subject of critical assessments. Many elements are used, in a recurrent way, to explain the gap between the funds invested in the improvement of the health of the populations, and the results obtained. The results of this article also corroborate those of Desgroseilliers and al (2016: 113), when they conclude in a similar study that: "Africa experiences the triple burden of communicable, non-communicable and socio-behavioural diseases, to which are added illiteracy, poverty and underdevelopment". In other words, this continent is at the bottom of all health and development indicators. Faced with the recurrence of Dracunculiasis, the Chadian government and its partners must focus not only on Guinea worm but also take into account the numerous fundamental problems of development or well-being, including Access to drinking water, educational and health centers, which are the sine qua non conditions for the eradication of Dracunculiasis as it was the case in several endemic countries, but which have succeeded in eradicating this endemic disease known as "empty granary", (Coulibaly, 2012).

V. ACKNOWLEDGEMENTS

We would like to thank the entire team of the National Guinea Worm Eradication Program without forgetting the rural communities of the endemic areas that participated in conducting this study. The study was carried out with funding from the Organisation de Coordination pour la Lutte contre les Endémies en Afrique Centrale (OCEAC), based on financial cooperation between the **Commission of the Economic and Monetary Community of Central Africa** (CEMAC) and the Ministry for Economic Cooperation and Development (BMZ) of the Federal Republic of Germany, through the KfW (German Development Bank).

VI. ETHICAL CONSIDERATIONS

This research focused on the behaviour of social actors. It did not include the clinical handling of samples in the laboratory. It did not ethically endanger any human or animal life. The research protocol was approved by the National Bioethics Committee of Chad ; No. 175 / PR / MESRI / SG / CNBT / 2019 of 10/09/2019. Field data collection took into account the requirements of free participation, confidentiality and anonymity. Cultural aspects and privacy were considered and respected. All persons contacted were informed of the purpose of the study and its aim, and prior oral permission was required to ensure voluntary participation.

REFERENCES

[1] Aubry, P. & Gaüzere, B. (2015). Maladies tropicales négligées, Actualités.

[2] Audibert, M. (1993). Invalidité temporaire et production agricole : les effets de la dracunculose dans une agriculture de subsistance ; in revue d'économie du développement.

[3] Aboubacar, O. (2004). Aspects épidémiologiques et préventifs de la dracunculose dans la région de Gao de 2003 à 2004, thèse de doctorat, Université de Bamako faculté de médecine de pharmacie et d'odonto-stomatologie.

[4] Brunet-Jailly, J. (2004). Conséquences économiques des maladies infectieuses.

[5] Becerra, S. & Roussary, A. (2008). Gérer la vulnérabilité de l'eau potable : une action publique désengagée ? Article disponible en ligne à l'adresse : https://www.cairn.info/revue-natures-sciences-societes-2008-3-page-220.htm ; consulté le 25/05/2020 à 14h.

[6] Bar, M. Penot, E. & Benz, H. (2011). Indicateurs de vulnérabilité, résilience durabilité et viabilité des systèmes d'activité au Lac Alaotra, Madagascar Définition des concepts, Rapport.

[7] Bureau d'Expertise d'Eau-d 'Assainissement de Développement et Ingénierie Sociale, (2020). Analyse du paysage pour l'assainissement, l'eau et l'hygiène (Wash) et la planification des maladies tropicales négligées (MTN) programme ASCEND-Tchad ; rapport, décembre.

[8] Coulibaly, M. (2012). La dracunculose dans la région de Gao : historique, épidémiologie et stratégies d'éradication (1er Janvier 1995-31 Décembre 2010), Université des sciences, des techniques et des Technologies de Bamako, Faculté de Médecine et d'Odontostomatologie, thèse de doctorat.

[9] Banque Mondiale. (2019). Tchad Note sur le secteur de l'eau et de l'assainissement, Rapport.

[10] Chippaux, JP. (1994). Le Ver de Guinée en Afrique, méthodes de lutte pour l'éradication. Paris : Orstom.
[11] Desgroseilliers, V. Vonarx, N. Guichard, A. et Roy, B. (2016). La santé communautaire en 4 actes. Repères, acteurs, démarches et défis, Canada, Presse Universitaire de Laval, 2016 ;
[12] Djouda Feudjio, YB. & Leumaleu-Noumbissie, U. (2019). Accessibilité sanitaire chez les personnes âgées en milieu rural au Cameroun ; Caisse nationale d'assurance vieillesse « Gérontologie et société » ; 2019/1 vol. 41 / n° 158 ; pp 41 à 55 ; Article disponible en ligne à l'adresse : https://www.cairn.info/revue-gerontologie-et-societe-2019-1-page-41.htm ;
[13] Diatta, A. (2015). Contraintes et facteurs de vulnérabilités et de crises liés à l'eau, mémoire de master en Géographie, UCAD (institut des sciences de l'environnement).
[14] Hours, B. (1984). Demande d'assistance et droit de protection : insécurité sociale et stratégies sanitaires au Cameroun ; Sciences Sociales et Santé - vol. II - no 3-4 - octobre 1984 ;
[15] Hours, B. (2001). Système et politique de santé ; De la santé publique à l'anthropologie, Paris, Karthala.
[16] Jodelet, D. (1989). Les représentations sociales. Paris, PUF.
[17] Lysaniuk, B. & Tabeaud, M. Les santés vulnérables des Suds ; Belin | « L'Espace géographique » 2015, pp 229-244 ; Article disponible en ligne à l'adresse : https://www.cairn.info/revue-espace-geographique-2015-3-page-229.htm;
[18] Mouliom Moungbakou, I. & Batibonak, S. (2018). Décentralisation et santé en Afrique : enjeux et stratégies des acteurs, édition Cheikh Anta Diop.
[19] Mbaihondoum, J. Mécanisation de la production agricole en milieu rural et sécurité alimentaire au Tchad : perceptions et usages des tracteurs par les paysans de la Tandjilé-Est, mémoire de master en sociologie ; Université de Yaoundé I.
[20] Mimché, H. & Djouda Feudjio, YB. (2018). Famille et santé en Afrique, regards croisés sur les expériences du Cameroun et du Bénin, Paris, l'Harmattan.
[21] Ministère de la santé publique. (2014). Stratégie nationale de santé communautaire, Rapport.
[22] Ndonky, A. Oliveau, S. Lalou, R. & Dos Santos, S. (2020). Mesure de l'accessibilité géographique aux structures de santé dans l'agglomération de Dakar, Cybergeo : European Journal of Geography [En ligne], Cartographie, Imagerie, SIG, document 751, mis en ligne le 07 décembre 2015, URL http://journals.openedition.org/cybergeo/27312 ; DOI : 10.4000/cybergeo.27312 ;
[23] N'detibaye, A. « Fréquentation des centres de santé en milieu rural tchadien. Analyse comparative des centres de santé du district sanitaire de Bousso dans le Chari Baguirmi », thèse de doctorat en sociologie, Université de Bordeaux 2.
[24] Obrist, B. (2006). Risque et vulnérabilité dans la recherche en santé urbaine ; la revue électronique en sciences de l'environnement [En ligne], Hors-série 3 | décembre 2006, mis en ligne le 20 décembre 2006, URL : http://journals.openedition.org/vertigo/1483.
[25] Ofouémé-Berton, Y. (2013). « L'approvisionnement en eau des populations rurales au Congo Brazzaville », Les Cahiers d'Outre-Mer [En ligne], 249 | Janvier-Mars 2010, mis en ligne le 01 janvier 2013, consulté le 31 Mars 2021 à 00h 22mn. URL : http://journals.openedition.org/com/5838 ; DOI : 10.4000/ com.5838.
[26] OMS. (1998). Septième conférence régionale africaine sur l'éradication de la dracunculose, rapport préliminaire.
[27] OMS. (1996). Critères de certification de l'éradication de la dracunculose, rapport.
[28] OMS. (2010). Agir pour réduire l'impact mondial des maladies tropicales négligées : Premier rapport sur les maladies tropicales négligées, rapport.
[29] OMS. (2018). Les maladies tropicales négligées, rapport.
[30] Programme Alimentaire Mondiale. (2011). Analyse globale de la vulnérabilité, de la sécurité alimentaire et de la nutrition en République du Sénégal, Rapport.
[31] Programme National d'Eradication de Ver de Guinée. (2013). Atelier intersectoriel de lutte contre le ver de Guinée, Rapport.
[32] Revue Camerounaise de Sociologie (2019). vol.1 nº 01. La vulnérabilité sociale en débat au Cameroun ; approche et interrogations sociologiques plurielles, L'Harmattan.
[33] Rosenstock, M. (1974). the Health Belief Model and Preventive Health Behavior ; https://doi.org/10.1177/109019817400200405
[34] Schéma Directeur de l'Eau et de l'Assainissement du Tchad. (2003), Rapport.
[35] Tessier, S. Jean Baptiste, A. & Ribeiro, M. (2004). Santé publique, santé communautaire, Editions Maloine, Paris.
[36] UNICEF. (2015). Les Objectifs de Développement Durable (ODD) de qualité dans des conditions équitables tout au long de la vie, rapport.
[37] *https://www.google.com/search?client=firefox-b-d&sxsrf=ALeKk02u5Nq5MV300IkrC8bnebejD9qEhA:1591829761461&q=Vuln%C3%A9rabilit%C3%A9+des+personnes+%C3%A2g%C3%A9es+au+Cameroun+:+formes+et+facteurs+Willy+Adrien+YAKAM1,+Yves+CARRI%C3%88RE2,+Thomas+LEGRAND2&spell=1&sa=X&ved=2ahUKEwi66eX7q_jpAhXhXRUIHYsEDgQQBSgAegQIARAo&biw=1366&bih=654;*