

## **SOCIO- ENVIRONMENTAL FACTORS ASSOCIATED WITH KNOWLEDGE, ATTITUDE AND PRACTICE AND DETERMINANTS OF CO-ENDEMICITY OF FILARIASIS IN CHICALA, KUITO PROVINCE OF BIÉ ANGOLA**

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**Abstract:** Filariasis is an acute and chronic parasitic disease, caused by filaria of the species: *Oncocerca Volvulos*, *Wucheria bancrofti* and *Loiase*, whose injuries have serious consequences for human health and as it is endemic in Angola, its study and control become imperative. Objective: To carry out an integrated study to identify filarial co-infection associated with social determinants and knowledge, attitude and practice of the population of Chicala, commune of Kuíto, province of Bié. Material and Method: After prior contact with administrators, a cross-sectional lecture study was carried out and a probabilistic cluster sample of 320 individuals from a universe of 6015 individuals was selected. After free and informed consent, a questionnaire was administered to collect clinical-socio-demographic data: Leopard skin sign or depigmentation, Blindness, elephant's foot, hydrocele and presence of eye worm. A biopsy of subcutaneous cellular tissue taken from the iliac crest or calf muscles was performed and a calibrated thick drop (GEC) was performed after digital puncture and a drop of dried blood was preserved on filter paper strips for the genetic detection of the species. Included photos with vector image *Simulium*, *Crysops* and *Anopheles*, *Aedes* and *Culex* to help interviewees inform about the diseases under study. Positive tests referred to the provincial NTD program to take Ivermetin 6mg/dose, each participant received one albendazole 400 mg tablet. For data processing, the Chi-square test was applied with a significance level of 0.05. Results: The average age of the participants was 32.5 years and the female sex was more represented 200 (62.5%) the male 120 (37.5%), the significance level was higher than 0.05, therefore the variables are not associated, so it is not pertinent to apply logarithmic analysis to associate knowledge, attitude and practice with the inequities

observed in social determinants, through a logarithmic linear model that allows detecting more significant effects and interpreting the relationships between the variables. The macroscopic lesions found were: (5.9%) hydrocele, 13(68.4%) Elephantiasis 3(15.7%) calibrated thick drop, 1(0.3%) positive for *Wucheria bancrofti* and (0) for *Loiase*; Leopard skin (depigmentation),8(2.5%) Blindness 3(15,7%), biopsy 174(%54.3) positive for *Oncocerca Volvulos*; The Knowledge, Attitude and Practice of the population the result was: Knowledge: (100%) inadequate; Attitude: (17%) marginalizes hydrocele, (29%) marginalizes blindness, (34%) marginalizes hydrocele, blindness and elephantiasis; Practice: (99.4%) uses repellent or sleeved shirt to protect against vector bites and 100% have never attended a lecture on filariae (99.7%) do not sleep under a mosquito net and (99.7%) do not take albendazole.

**Conclusions:** The clinical-laboratory findings prove the existence of co-infection: *Oncocerca Volvulos* and *Wuchereria bancrofti* in the adult population and stimulates the distribution of ivermectin for prevention and treatment in Chicala under Community Directive without risk of side effects, after the molecular biology results confirm the GEC findings, we recommend informing the population about filariasis associated with the distribution of ivermectin and the improvement of social determinants in chicala.

**Keywords:** *onchocerciasis*; *lymphatic filariasis*; *loiasis*; *ivermectin*; *co endemicity*.

## INTRODUCTION

Infection by filarial nematodes from the Onchocercidae family is among the most debilitating diseases and is estimated to affect more than 150 million people. They are causative agents of filariasis: *Wuchereria bancrofti* (FL) and *Onchocerca volvulus* (OV), of greater relevance and concern because the

infection can result in significant deformity and make the person unable to work for self-sustenance with a consequent obstacle to socioeconomic development in endemic regions. (O'Neill et al., 2018); The fight against onchocerciasis is mainly based on the distribution of ivermectin (Mectizan®). This drug is generally well tolerated, but encephalopathy may occur after ivermectin administration in individuals with high *Loa loa* microfilaremia. (Kamgno et al., 2000)

*Loiasis* “tropical eye worm”, parasitizing population in the rainforest of Central and West Africa is transmitted by two species of tabanids: *Chrysops silacea* (Austen) and *C. dimidiata* (Kelly-Hope et al., 2017); estimate more than 10 million people with *Loiasis* in Central Africa, (Whittaker et al., 2018) Onchocerciasis is the 3rd leading cause of infectious Blindness (after trachoma) in the world. (Prieto et al., 2016) Estimation based on the calculation of Disability Adjusted Life Years (DALYs ) point out blindness, visual impairment and oncocercal pruritus affecting the skin, and represents a significant increase in mortality in severe infections caused by *O. volvulus*. (Márcia Maria Cavalcanti Marcondes, 2010). According to Dreyer and Norões (1998), lymphatic filariasis is a stigmatizing disease, it affects both sexes and the worsening of the disease in women is perceived by changing habits such as hiding the affected limb with the clothing adopted to hide the impossibility most of the time. of wearing shoes, stopping going to public places, those who work outside the home, lose their jobs and, in most cases, avoid sexual contact. In men, the problem leads to the inhibition of interpersonal relationships, especially with their partner, and this problem is also a complex factor at work. Additionally, they feel ashamed, discriminated against, isolated in their homes, making it difficult for them to socialize, as well as adhere to any form of

treatment due to low esteem (Marcondes, 2010).

There are multiple causes, which make it difficult to eliminate vector diseases; Others are operational, for example, low drug coverage and/or bad timing planning for mass drug administration, while others are sociological, large-scale apathy and occasional resistance on the part of individuals and communities to participate in treatment. (Loum et al., 2019)

On the other hand, several socioeconomic factors have been associated with the transmission of onchocerciasis and filariasis in the rural population, including agricultural/outdoor employment, poverty, poor education, and poor housing infrastructure, such as lack of good drainage. However, other factors that represent poverty, such as lack of electricity (light at night) and nutritional status (for example, malnutrition can affect the ability of immunity to fight disease) may also play a role. Environmental factors that can influence transmission are related to the ecological requirements of the main vector species and include the combination of climate and topographic characteristics. Studies refer to seasonal precipitation, population density and minimum temperature as important predictors of infection rates. Filariasis is associated with life in rural areas, where there are vectors that transmit filariasis. They reproduce in waters polluted with organic material, such as waste, excrement and decomposing plants. (Williams et al., 2023).

*The O. volvulus*, causative agent of *oncocercose*, remains endemic in most of Africa, despite mass administration campaigns of “ivermectin” for more than three decades. Deformities resulting from complications of filariasis are still a product of inequities in the support of health services. (World Health Organization, 2021; WHO/APOC, 2011; Sambo, 2006);

In Angola rapid assessment and monitoring

of onchocerciasis (REMO), carried out in 2002 and 2003, considered Bengo, Uige, Cuanza Norte, Lunda Norte and L. Sul, Moxico, Kuando Kubango, Huila and Benguela endemic for onchocerciasis and the rapid assessment of loiasis showed a prevalence of loiasis in Cabinda, greater than or equal to 40%, Bengo, Zaire and Cuanza Norte, prevalence greater than 20%, and less than 40% and Lunda Norte and Lunda Sul with prevalence between 1-9% (REA) (MINSA/PNCDTNs, 2015; WHO/APOC, 2005). Ivermectin Treatment Areas have been classified under Community Directive (TIDC) for decades. The province of Bié does not carry out treatment with ivermectin under community directive (TIDC) although, it records cases of Blindness, leopard skin and subcutaneous nodule, it is important to justify with data the request for donation of ivermectin to the population and start carrying out treatment with Ivermectin under community directive. This integrated study, which identifies the species of co-infection and analyzes the interaction of social determinants based on development and transmission and associates the population of Chicala, municipality of Kuíto province of Bié, with knowledge, attitude and practice of human filariasis, and produces a strategy with evidence for the location studied, justifying the distribution of ivermectin and helping to define the position that Angola must have in relation to the goals recommended by the WHO: for the elimination of lymphatic filariasis in 2025 and for Onchocerciasis in 2030 (MINSA/ PNCDTNs, 2015; WHO/APOC, 2011).

## MATERIAL AND METHODS

Research approved by the ethics committee with number: 17/2021, preferential cross-sectional study of social, environmental and biological determinants associated with knowledge, practice and attitude and

prevalence of onchocerciasis, lymphatic filariasis and loa loa in Chicala the research trained and involved 3 interviewers 1 guide and 2 microscopists, who administered a questionnaire to 25 residents in the 12 conglomerates selected from a probabilistic sample of 320 residents, on different days from a population of 6015; provided by the local administration who gave free and informed consent and recorded signs of leopard skin, Blindness, elephant foot, hydrocele and presence of eye worm and biopsy of subcutaneous cellular tissue in the iliac crest or in the calf muscles and the stratum removed from the skin and crushed on the glass slide and hydrated in 1 drop of saline solution and placed and analyzed with a binocular optical microscope (HC Olympus®), with a 10x objective, regarding the presence or absence of *Oncocerca volvulus* and 1 drop of fresh blood was collected by digital puncture and applied to a smear slide on the coverslip on top and for reading stained with giemsa in the Binocular optical microscope (HC Olympus®) and observing the presence or absence *Wuchereria bancrofti* and *Loa loa* and preserved drops of dried blood on Whatman filter paper strips for genetic confirmation of the presence of *Wuchereria bancrofti* and *Loa loa*. Added to inquiry vector image photo: *Simulium*, *Crysops* and *Anopheles*, *Aedes* and *Culex* to help interviewees inform about the diseases under study. The Chi-square test was applied after data processing and without coercion to the participants, those positive for the tests were sent to the provincial program for neglected tropical diseases (NTDs), and at the end of the survey, albendazole 400 mg was distributed.

The Ombala Chicala, traditional designation of the Ekovongo kingdom, officially represented by Elombe, the name in the local language of the official residence where the oSoma Grande lives, the greatest

traditional authority assisted by the Sekulos, chiefs of the Imbo “village” and olupali “small villages”. (Ceita, 2014), located at 52 Km<sup>2</sup> in the municipality of Kuíto, coordinates Elevation 1426 m / S: 12.71512 C / E:17.17303 C 12° 23’ “S 16° 56’ limited between the municipalities of Kambândua, Chitembo and Matumbo);

The sample value was calculated based on the tolerable margin of error of 5% at the standard value of 400 and obtained 320 people, all of whom were residents of (Ombala) in Chicala for 5 years or more, with and without filariasis, present at the site, participating. on the day of the survey and agreed to participate and those absent were excluded from the results of the CAP, adopted as a theoretical reference the study by Santos 2009, on investigation of aspects of knowledge, attitude and practice in the approach taken which included:

- 1) Conceptual dimension of understanding a given fact (knowledge between adequate (good), regular and not adequate (insufficient)
- 2) Emotional dimension (attitude) the sum of the responses for each type of attitude answered by participants
- 3) Social dimension (practical)

## RESULTS

The age of the participants ranged from 10 years to 70 years, average 32.5 years, the most represented female sex (62.5%).

Species	n=320	(-)	(%)	(+)	(%)
<i>O. Volvulus</i>	(biopsy)	205	64	115	35.9
<i>W. bancrofti</i>	(Thick Drop)	301	99.6	1	0.4
<i>L. Loa (V. Eye)</i>	(Calibrated)	320	100	0	0

**Table 1:** Descriptive statistics of biopsy and GEC results in Chicala Bié.

\* The percentage was calculated taking into consideration, the total number of respondents n=320

Variable		No	%*
State of Social Determinants	Not acceptable	201	62,8
	Acceptable	119	37,2
	Satisfactory	0	0,0
Knowledge	Inadequate	320	100,0
	Regular	0	0,0
	Adequate	0	0,0
Practice	Not practiced	320	100,0
	Sporadic	0	0,0
	Habitual	0	0,0
Attitude (Marginalized)	Hydrocele	55	17,2
	Blindness	95	29,7
	Elephantiasis	1	0,3
	Hydrocele and Blindness	15	4,7
	Hydrocele, Blindness and Elephantiasis	110	34,4
	Blindness and Elephantiasis	10	3,1
	Accepted	34	10,6

**Table 2:** Descriptive statistics of the relationship between living conditions and CAP in Chicala Bié

\* The percentage was calculated taking into consideration, the total number of respondents n=320

Question	Answer	No	%*
Does the person wear repellent and a long-sleeved shirt if they go to the river or work?	No	318	99,4
	Yes	2	0,6
Does the person attend a lecture on NTDs?	No	320	100,0
	Yes	0	0,0
Does the person sleep under an ITN and destroy mosquito breeding grounds?	No	319	99,7
	Yes	1	0,3
Does the person take Albendazole?	No	319	99,7
	Yes	1	0,3

**Table 5.** Descriptive statistics of the practice for preventing filariasis in Chicala Bié

\* The percentage was calculated taking into consideration, the total number of respondents n=320



## DISCUSSION

The study aimed to identify the co-infection of human filariasis in the town of Chicala and related some determinants that contribute to the transmission of *oncocerca volvulus*, *wucheria bancrofti* and *loa loa*, associating questions about knowledge, attitude and practice (CAP) with the results observed on the lives of people from chicala reveals relevant inequalities that contribute to the increase in the transmission and progression of filariae and co-infection. 61.6% of participants have no salary, 69.4% have difficult access to food; 4.4. %, lives in severe food insecurity; 75.9% the water source is the stream; 65.3% unoccupied; 41.3% of garbage and waste are discarded in the open. When comparing the results with those of Tijana William, “on socioeconomic and environmental factors associated with the distribution of high prevalence of morbidity from lymphatic filariasis in Bangladesh, 2023” we conclude that both studies record similar inequities that facilitate the transmission of *Wuchereria bancrofti*. Similar results were obtained by Adriano J.R. et al 2000 in the article «Construction of healthy cities: a viable strategy for improving the quality of life», The quality of life of a population depends on the conditions of existence, access to economic and social goods and services: employment and income, basic education, adequate food, access to good health services, basic sanitation, housing, good quality transport, etc. similar to the data recorded in Chicala. The result of knowledge, attitude and practice revealed (62.8%) with inadequate knowledge and living in an unacceptable condition and 37.2% with inadequate knowledge in an acceptable living condition; The Pearson test did not observe any significance to knowledge, because the ‘inadequate’ level was a constant in the respondents’ responses. Unlike the result of Cilundika Mulenga Philippe 2014 “knowledge, attitude and practice of the

population in the health area of Sambwa”, which classified as good the different knowledge of chicala with an inadequate level of knowledge, the reason for the difference between the result of Sambwa with Chicala is based on the fact that Sambwa has been a TIDC health area for some time and there is a habit of administering albendazole en masse, unlike chicala, which has never distributed Ivermetin or albendazole; Regarding the local name of onchocerciasis used by the population, local name of lymphatic filariasis used by the population and local name of *loa loa* used by the population: (11.6%) elephantiasis is called tala or mina, 28.4% hydrocele is called m’ bumbi and 2.5% to *loa loa* chama alongando. Regarding the practice of preventing onchocerciasis, lymphatic filariasis or *loa loa* do not exist in Chicala: there was never a lecture on onchocerciasis and other filariasis, they said they do not sleep under mosquito nets and do not take albendazole and the Pearson test also did not observe significance because the answer ‘not practical’, was constant in the respondents’ responses the similarity of knowledge the results of practice are explained by the fact that Chicala has never been a TIDC area, unlike the health area of Sambwa, where the distribution of mosquito net, albendazole, lectures are regular. Regarding attitude, 21.3% marginalize the person who has hydrocele, or is blind or has an elephant’s foot and 19.1% marginalizes the blind person, 8.8% marginalizes the person with hydrocele and 10% accepts the person with onchocerciasis and other filaria, regarding the Pearson value, for attitude it was 0.12, which shows a correlation between the deformation or disfigurement or even the incapacity of the bearer with the attitude of the people of Chicala;

Question	Answer	No	%*
Performance	Without salary	197	61,6
	1 minimum salary	122	38,1
	2 salaries	1	0,3
Food access	Not varied	222	69,4
	Varied	98	30,6
Food safety	Severe Insecurity	14	4,4
	Moderate Insecurity	251	78,4
	Mild Insecurity	55	17,2
Disposal of rubbish and waste	Latrine	2	0,6
	Open place	132	41,3
	The person doesn't know how to explain	116	36,3
	Hole	70	21,9
Type of deformity	No deformity	302	94,4
	Elephantiasis	3	0,9
	Hydrocele	3	0,9
	Blindness	12	3,8
Water source	Faucet	1	0,3
	Fountain	1	0,3
	Stream	243	75,9
	Cacimba	75	23,4
Occupation	Without occupation	209	65,3
	Lumberjack	3	0,9
	Agriculture	108	33,8

**Table 3.** Descriptive statistics of the determinants researched in Chicala Bié

\* The percentage was calculated taking into consideration, the total number of respondents n=320

	Question	Answer	No	%*
	Does The insect Transmit f. lymphatic?	I don` t know.	320	100,0
		Mosquito	0	0,0
		Fly	0	0,0
Who	Does the insect transmit loa loa?	I don` t know.	320	100,0
		Mosquito	0	0,0
		Fly	0	0,0
	Does the insect transmit onchocerciasis?	I don` t know.	320	100,0
		Mosquito	0	0,0
		Fly	0	0,0
	elephantiasis, enlargement of the scrotum	I don` t know.	320	100,0
		Elephant's foot	0	0,0
The person has already heard	Worm in the eye	I don` t know.	320	100,0
		Worm (in the eye)	0	0,0
	Oncocercose	I don` t know.	320	100,0
			0	0,0

How	It gets onchocerciasis	I don't know.	320	100,0
		Bite (simulium)	0	0,0
	It gets f. lymphatic	I don't know.	320	100,0
		Bite (mosquito)	0	0,0
	It gets the worm in the eye	I don't know.	320	100,0
		Bite (crysops)	0	0,0
	eye worm site	I don't know.	312	97,5
			8	2,5
Name	onchocerciasis site	Kuaça kuaça	0	0,0
		I don't know.	283	88,4
	elephantiasis site	Traditional splint or mine	37	11,6
		I don't know.	229	71,6
	site of enlargement of the scrotum	m'bumbi	91	28,4
		I don't know.	320	100,0
Symptoms	Onchocerciasis	I don't know.	320	100,0
		Blindness, itching, lump	0	0,0

**Table 4.** Descriptive statistics of knowledge of filariasis in Chicala Bié

\* The percentage was calculated taking into consideration, the total number of respondents n=320

		Assessment of social determinants (conditions) according to CAP								Significance (chi square test)
		Not acceptable		Acceptable		Satisfactory		Total		
		No	%*	No	%*	No	%*	No	%*	
Knowledge	Inadequate	201	62,8	119	37,2	0	0,0	320	100,0	No significance found in the chi square, the answer "inadequate" was a constant of Knowledge
	Regular	0	0,0	0	0,0	0	0,0	0	0,0	
	Adequate	0	0,0	0	0,0	0	0,0	0	0,0	
Practice	The person does not practice it	201	62,8	119	37,2	0	0,0	320	100,0	No significance found in the chi square, the non-practical response was a constant of Practice
	The person practices it	0	0,0	0	0,0	0	0,0	0	0,0	
	Regular	0	0,0	0	0,0	0	0,0	0	0,0	
Attitude (Marginalized)	Hydrocele	28	8,8	27	8,4	0	0,0	55	17,2	0,12
	Blindness	61	19,1	34	10,6	0	0,0	95	29,7	
	Elephantiasis	0	0,0	1	0,3	0	0,0	1	0,3	
	Hydrocele and blindness	10	3,1	5	1,6	0	0,0	15	4,7	
	Hydrocele, blindness and elephantiasis	68	21,3	42	13,1	0	0,0	110	34,4	
	Blindness and elephantiasis	9	2,8	1	0,3	0	0,0	10	3,1	
	Accepted	25	7,8	9	2,8	0	0,0	34	10,6	

**Table 6:** Descriptive statistics of the determining relationship between knowledge, attitude and practice in relation to filariasis in the chicala population

\* The percentage was calculated taking into consideration, the total number of respondents n=320



## CONCLUSION

The Clinical-laboratory findings prove the existence of co-infection: *Oncocerca Volvulos* and *Wuchereria bancrofti* in the population between 11 and over 60 years old; And the findings encourage administration of Ivermectin in Chicala without risk of side effects;

If the results of the research on the genetic species circulating in Chicala confirm the findings of skin and blood microscopy, the town of Chicala must recommend and carry out the administration of ivermectin accompanied by education and better information to the population about filariasis, water supply, distribution and use of mosquito nets.

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