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Risks Sanitary Dregs To The Consumption Of Water Contaminated In Farming Environment In Drc: Case Of The Province Of The Tshopo.

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Abstract
Water is a precious and essential natural resource for multiple uses, but his/her/its quality is confronted to several problems of which the pollution bound to the activities anthropiques, from where the necessity to contribute to the improvement of the quality of the consumption water. Thus, a transverse, descriptive and analytic survey, that was about 840 chosen households in an uncertain way, has been achieved in order to have an idea on the sanitary risks bound to the consumption of water contaminated. Samples of water of the sources, rivers, of the households and boring have been appropriated and have been analyzed while using the bacteriological methods and parasitologicals. The results showed that there are only 4,8% of the drinking water that conform to instructions of the WHO, in Province of the Tshopo. The majority of the farming households gets a stock in water of the non arranged sources, of the streams and the traditional wells, either 47,74%; 25,60% and 8,21% of the cases respectively. There is only a weak proportion of the farming population that revitalizes himself in water by the arranged sources and boring, either 9,52% and 3,45% of the cases respectively. 99,04% of the farming population don't make the control of the quality of the drink water before the consumption; against 0,96% of the one that make it. The big majority of the farming population of the Province of the Tshopo is not about water before the consumption, either 88,21% of the cases; against 11,79% of those that treat it before the consommation.10,48% some households don't have some latrines. The traditional latrines are the more used in farming environment of the Province of the Tshopo, either 74,77% of the cases. On the households having some latrines simultaneously, 32,97% among them are situated unless 15 meters of the source of provision in water. Most farming households only have wild garbage dumps to evacuate their garbage, either 71,55% of the cases. The farming population rejects waters used in the street and in the court of the households, either 72,26% and 21,55% of the cases respectively. Five types of parasites have been put in evidence in waters consumed in farming environment of the Province of the Tshopo during the period of our survey: the cysts of the protozoa (Entamoeba coli, Entamoeba histolytica and Giardia lamblia), the eggs of helminthes (Ascaris lumbricoides, duodenal Ankylostoma), the larvas of Anguillule. On 882 samples of analyzed waters, the majority contains cysts of E. coli and of E. histolytica, of the œufs of duodenal Ankylostoma and Ascaris lombricoïdes, including the larvas of Anguillule, either 97,10%; 79,60%; 79,10%; 50% and 82,20% respectively. While the weak proportion has been observed in the cases of cyst of Giardia lamblia and Trichomonas, either 17,30% and 3% respectively. The intestinal parasitose and the typhoid fever constitute the illnesses to water transmission the more observed at our investigated, either 41,19% and 28,21% of the cases respectively. On the other hand, the least proportion has been observed for the other infections, to know, the dermatitises, the Gastroenteritis and the cholera, either 15,24%; 11,55% and 3,81% of the cases respectively. The biologic analyses showed that the samples of water analyzed are contaminated to various degrees by the germs kept by the criterias. The majority of these germs led strong rate of nonconformity. The setting up of the rustic systems of purification of waters used in the developing countries, especially in the zones where resources in water are limited, could contribute appreciably to the reduction of the sanitary risks bound to the practices current of agricultural reuse of waters used in agriculture. Some suitable measures must be taken for the decontamination of these waters before the consumption.

Key words: Sanitary risk, intestinal parasitic, source of provision in water, contaminated water, illness to water transmission, DRC.

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I. Introduction

The access to a healthy drink water is an indispensable condition to health, an elementary human right and a key component of the protective efficient policies sanitary. The importance of water, purification and hygiene for health and the development shows in the findings of a set of international political forums, as the world Conference on the water of Mar Plata del (Argentina), the objectives of the Millennium for the development, adopted by the general assembly of the United Nations (UNO) in 2000.

The demographic expansion and the economic flight that the countries of the world know and especially those of Africa have some consequences on the environment and on the plans of water due to the lack of purification infrastructures (Agassounon Tchibozo and al., 2012).

In the world, 1,1 billion of people is deprived of access to systems improved of provision in water of drink; 94% of the episodes diarrhea are avoidable in return for modifications of the environment, notably by interventions intended to increase the clean water offer and to improve hygiene and purification (WHO, 2007). In Africa, and more especially to Togo, the deficiency in drinking water is a major problem, because of the galloping demography, coupled to a badly controlled urbanization. The weak availability of the drinking water in the zones urban, out-of-town and farming, constrained the populations to get a stock in water of well and boring. If these works have the advantage to solve the problem of the water availability, the quality of this commodity is not often guaranteed. The evaluations of the WHO reveal that the population who depends on the points of water non improved rises to 884 millions people, the majority being in sub-Saharan Africa where the rate of access to the drinking water, purification and hygiene is the weakest of the world. Only 46% of the farming population and 81% of the urban population have access to the drinking water (WHO, 2006). To Togo, the percentage of the population having access at a source of drinking water improved passed from 59% in 2010 to 60% in 2012. The number of case of the water illnesses in Togo increases with the passing of the time, especially in the zones deprived of the sources of drinking water. In spite of the existence of multiple boring and well, the access to the drinking water remains a major problem for the Togolese population (Ali, 2004). The bad quality of water can be led by activities anthropiques, notably the pollution, as well as the bad purification and the hygiene of the sources of waters (Torkil, 2004,; Nanfack and al., 2014).

In the same way, instructions of the WHO insist to that that a healthy drink water doesn't present any considerable risk for a person's health that consumes it on the whole length of his/her/its life, considering the possible variations of sensitivity to the different stages of life. The more expositions to the risk of illnesses transported by water are the infants and the young children, the weakened people and the aged people, in particular, when they live in unsanitary conditions. These last, that are generally the more exposed to the risk of illnesses to water transmission, must take supplementary measures to avoid to expose itself/themselves to the pathogenic agents transmitted by water, for example while making boil their water of drink, since a healthy drink water is necessary for all usual domestic uses, notably to drink it, for the preparation of the meals and the personal hygiene (WHO, 2017).

In RDC, especially in farming environment of the Province of the Tshopo, the wells, the streams, the rivers, the sources, the stream and the boring constitute the main sources of provision in water. The consumption of these waters exposes the population to illnesses of microbial origin as the cholera, the typhoid fevers, bacillary dysenteries, diarrheas and gastroenteritis, hepatitis TO and E, amoebic dysenteries (Kazadi, 2012).

In 2002, a survey revealed that the waters of well in the zone South Lagunaire of Lomé were contaminated by Coliformes thermotolérants and Escherichia coli (Sadaoc, 2002).

According to the World organization of Health, water destined to the consumption and the needs of the households must not contain any pathogenic microorganismes; no sample of 100 ml of a water destined to the consumption must contain germs anaerobic sulfitoréducteurs, of coliformes and streptococci (WHO, 2008).

Escherichia coli, bacterium witness of contaminations of fecal origin of waters has been recovered in the waters of wells and boring of some districts of Big Popo (Makoutode and al., 1999) and of Bamako (Coulibaly, 2005).

Nowadays, few data are available on the sanitary state of the sources of provision in drinking water in farming environment in RDC.

The question of the sanitary quality of water destined to the human consumption cannot be considered separately, because it imports to take account of other aspects, whose purification is the most important. According to the Program common WHO/UNICEF, the microbial contamination of the drink water is due to the fact that about 2,6 billions of people don't have access always to services of basis purification.

With air and soils, waters are part of the elements that serves therefore either of place of lodging for the autochthonous species, either of channel to transport the bacteria in transit eliminated by the man, the animals and the plants (Rodier and al., 2009).

The human or animal stools are therefore an important source of pollution because of their microbial load (bacteria, virus, protozoa and of pathogenic helminthes) (WHO, 2004).

Of this survey, we think that the consumption of waters contaminated exposes the population to illnesses of microbial origin as the cholera, the typhoid fevers, bacillary dysenteries, diarrheas and gastroenteritis, hepatitis A and E and parasitoses.

The objectives pursued in this survey are:

- To put in evidence the microbes that expose the farming population to contract the illnesses to water transmission in the analyzed waters;
- To measure the sanitary risks to which is exposed the people who use water contaminated for their needs.

II. Matériel And Methods

II.1. Middle of survey (Pronanut Tshopo, 2021).

Situated at the North Of the Democratic Republic of Congo (DRC), the Province of the Tshopo spreads on a surface of 197 657 Km²s. She/it is therefore the vast province of the RDC.

His/her/its population is estimated to 3.102.477 inhabitants, with a density of 15,6 hab. / Km². It is situated to 1°13'603 " of North latitude in relation to the equator and to 23°36'232 " of longitude is in relation to the meridian of Greenwich, with a middle altitude of 473 m above the sea level; but departure is also situated and of other of the Congo stream.

On the administrative plan, the province consists of 1 City of Kisangani, 6 townships (Makiso, Kisangani, Kabondo, Mangobo, Lubunga and Tshopo); 7 administrative territories (Basoko, Isangi, Yahuma, Banalia, Bafwasende, Ubundu and Opala) ;199 Sectors and Chefferieses; 23 zones of Health and 426 Aires of Health.

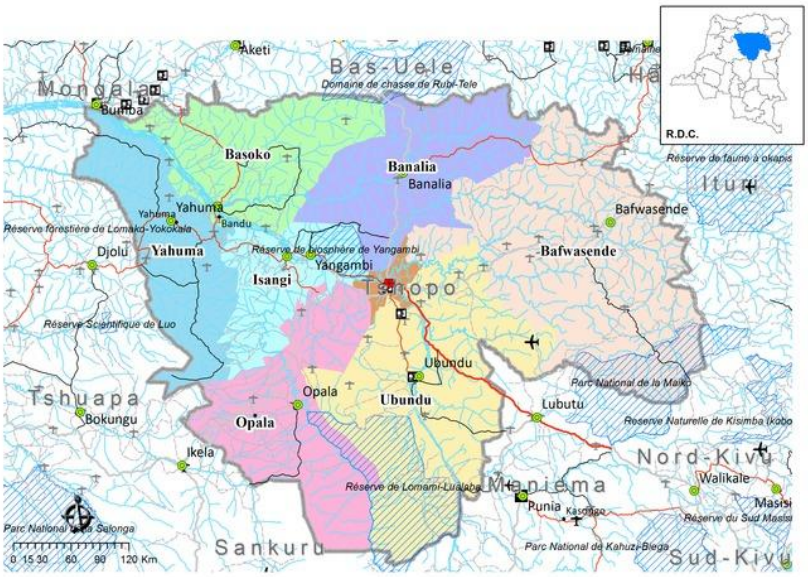
She is limited naturally:

- To the East by the Avakubi river and the Provinces of the Ituri and North Kivu;
- To the west by the Itimbiri river and the provinces of the Mongala and Tshuapa;
- To the North by the river Television and the provinces of Low-Uélé and High-Uélé;
- To the South by the Provinces of Maniema and Sankuru.

The Province of the Tshopo knows only one equatorial climate, according to the classification of Köppen-Geiger, characterized by a yearly middle temperature of 25°C, with a yearly thermal amplitude of 1,7°C. The minimal and maximal middle temperatures vary between 18°C and 30°C. The middle precipitations vary from 64,1 to 494,6 mm between the driest month and the most humid month. They are irregular in the time and in the space. The Province of the Tshopo knows four seasons économétriques:

- the big season of rains: spreads from August 15 to December 15;
- the small season of rains: go from March 15 to May 15;
- the big dry season: spreads from May 16 to August 14;
- the small dry season: go from December 16 to March 14

The vegetation of the Province of the Tshopo is dominated by the dense forest, constituted of the trees and bushes of middle density. Besides, one finds the argilo-gritty soil there, makes of shoed soil (yellow, red and ocher latasols), Ferri soil and areno - shoe-soil, and cover the whole province; and that the central pan constitutes the most dominant relief.

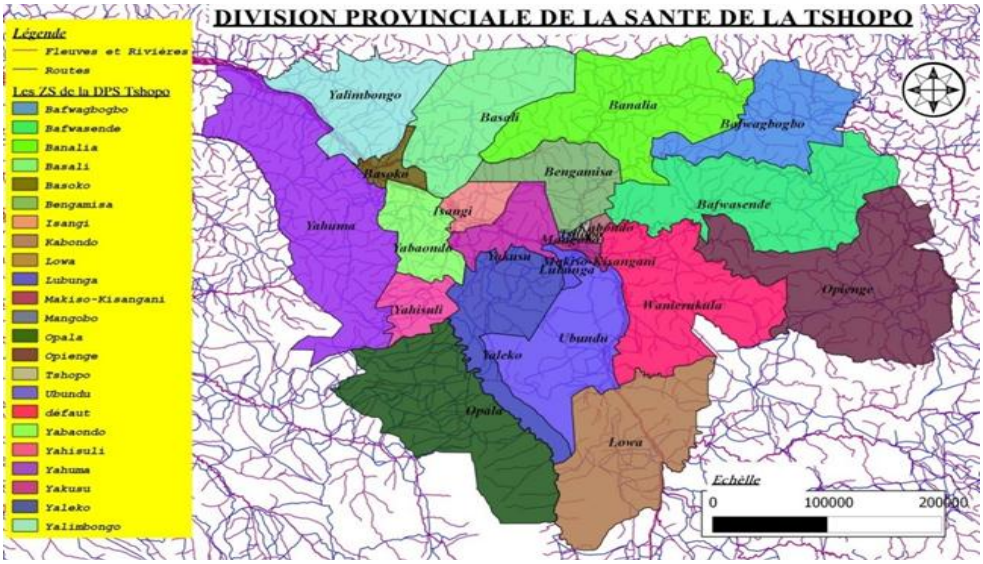


Face 1: Administrative card of the Province of the Tshopo (Caid, 2022)

II.2. Setting of the survey

Our survey has been led in the 7 seven zones of health of the province of the Tshopo, to know,: Bafwasende, Basoko, Bengamisa, Lubunga, Opala, Wani-rukula and Yakusu, precisely in 6(six) villages by Zone of health, at the rate of 3(trois) villages certified by the organization Purified non governmental Village and 3(trois) non certified villages. The biomedical laboratory experimental site served General Hospitals of the References of every health zone for the realization of this survey.

The 23(Vingt three) different zones of health of the Province of the Tshopo are represented below in the card:



Face 2: The different zones of the Province of the Tshopo (Pronanut Tshopo,2022).

II.3. Experimental Methodology

The setting in evidence of the microbes that exposes the farming population to contract the illnesses to water transmission in the waters of consumption has been achieved by the setting up of the protocol of numbering of the bacteria, of the œufs of helminthes and the cysts of protozoa in these waters, while proceeding by analysis of eight hundred eighty-two (882) samples of water, at the rate of 126 samples by zone of health, of which 840 for the households and 42 for the points of provision in water. In order to cover the whole range of the parasites, the method of Ritchie (Klutse and al., 1995) has been used, because of his/her/its performance, and permits to recover the larvas and cysts of protozoa easily, but also the œufs and larvas of helminthes in water. The bacteriological analyses of our samples were about the isolation and numbering of the bacteria on their

specific surroundings, to know Lauryl-Sulphate agar, XLT4, Luria Bertani e M-Enterococcus agar. The sought-after germs were the coliformes (fecal and total), the Salmonella, the fecal Streptococci and the E. coli.
A semi-structured investigation questionnaire allowed us to determine the factors of sanitary risk to which are exposed the people who consume water contaminated for their needs, carried on 840 chosen households in the heap. In every household, the person in charge of provision in drinking water has been investigated. The following data have been collected : socio-economic features of the households; source of provision in water and uses; Hygiene, purification, environment and illnesses to water transmission more fluently contracted.

III. Resultats And Discussion

The results of this survey are presented according to the parameters collected.

III.1. Appreciation of the microbiological quality of the consumption water

1° Bacteriological quality of water

The results of the bacteriological analyses done are presented below in the picture 1.
The norms for the quality of the water of consumption of Feachem and the WHO acted as basis to the interpretation of our results.

Picture 1: *Bacteriological quality of water following the dawneds of provision in water (source, river and boring) and the classification of the WHO and Feachem.*

Dawned of water	**Bacteriological parameters**					**Quality of water according to the WHO**	**Quality of water according to the Feachem**
	C.F	**C.T**	**S.F**	**E.coli**	**Salmonella**		
Source Akolikotcha	34	62	56	A	44	No drinkable	Acceptable
Source Bokululu	8	58	66	P	2	No drinkable	Acceptable
Boring Yandafe	0	4	21	A	12	No drinkable	Acceptable
Source Bakonga	16	16	26	A	0	No drinkable	Acceptable
Source Musenge	0	6	46	A	0	No drinkable	Acceptable
Source Adjigidjigi	23	88	76	A	15	No drinkable	Acceptable
Source Angombe	30	57	86	A	21	No drinkable	Acceptable
Source Tsalama	0	0	21	A	0	No drinkable	Acceptable
Source Nyangedebia	88	62	91	A	32	No drinkable	Acceptable
Source Adobo	88	10	31	A	13	No drinkable	Acceptable
Source Badjoge	21	32	56	A	5	No drinkable	Acceptable
Source Ngande	20	84	65	A	11	No drinkable	Acceptable
Source Chololo	0	32	9	A	0	No drinkable	Acceptable
Source Botokona	2	62	19	A	8	No drinkable	Acceptable
Source Masumbuko	0	0	0	A	0	No drinkable	Acceptable
Source Sinailanga	9	13	8	A	19	No drinkable	Acceptable
Source PK76	10	33	10	P	6	No drinkable	Acceptable
Source Amakulu	0	21	0	A	0	No drinkable	Acceptable
Boring Bafwadodi	0	53	0	A	0	No drinkable	Acceptable
Boring Bafwamondulu	0	53	0	A	0	No drinkable	Acceptable
Source Kimbangu	14	129	13	A	20	No drinkable	Unfit
Source Balambi	0	453	12	A	0	No drinkable	Unfit
Source Caritas	0	37	0	A	0	No drinkable	Acceptable
Source Bafwa	0	123	0	A	0	No drinkable	Unfit
Source Betombe	9	4	7	P	15	No drinkable	Unfit
Source Ngenengene	0	0	0	A	0	Drinkable	Drinkable
Source Busandja	0	0	0	A	0	Drinkable	Drinkable
Source Bale	0	365	16	P	0	No drinkable	Impropre
Source Kirundu	36	76	28	P	23	No drinkable	Acceptable
Source Lobonga	12	65	18	A	16	No drinkable	Acceptable
Source Isoloiyongo	28	32	57	A	4	No drinkable	Acceptable
Source Isoloisimo	8	28	21	A	9	No drinkable	Acceptable
Source Isoloofala	16	128	39	A	3	No drinkable	Acceptable
Source Miakamiaka	80	357	500	P	32	No drinkable	Acceptable
Source Yuho	38	20	65	A	25	No drinkable	Acceptable
Source Letuteme	29	66	106	P	42	No drinkable	Unfit
River Aruwimi	35	158	66	P	43	No drinkable	Unfit
Source Gbundu	14	82	46	A	8	No drinkable	Acceptable
Boring Makele	2	54	22	A	22	No drinkable	Acceptable
Boring Bombanzoto	0	6	86	A	0	No drinkable	Acceptable
River Lulu	44	88	126	P	51	No drinkable	Unfit
Source Plaine	22	84	126	P	12	No drinkable	Unfit
TOTAL	**736**	**3101**	**2041**	-	**513**	-	-

Legend: C.F= Fecal Coliformes ; C.T = Total Coliformes ; SF= fecal Streptococci ; E.coli= *Escherichia coli*

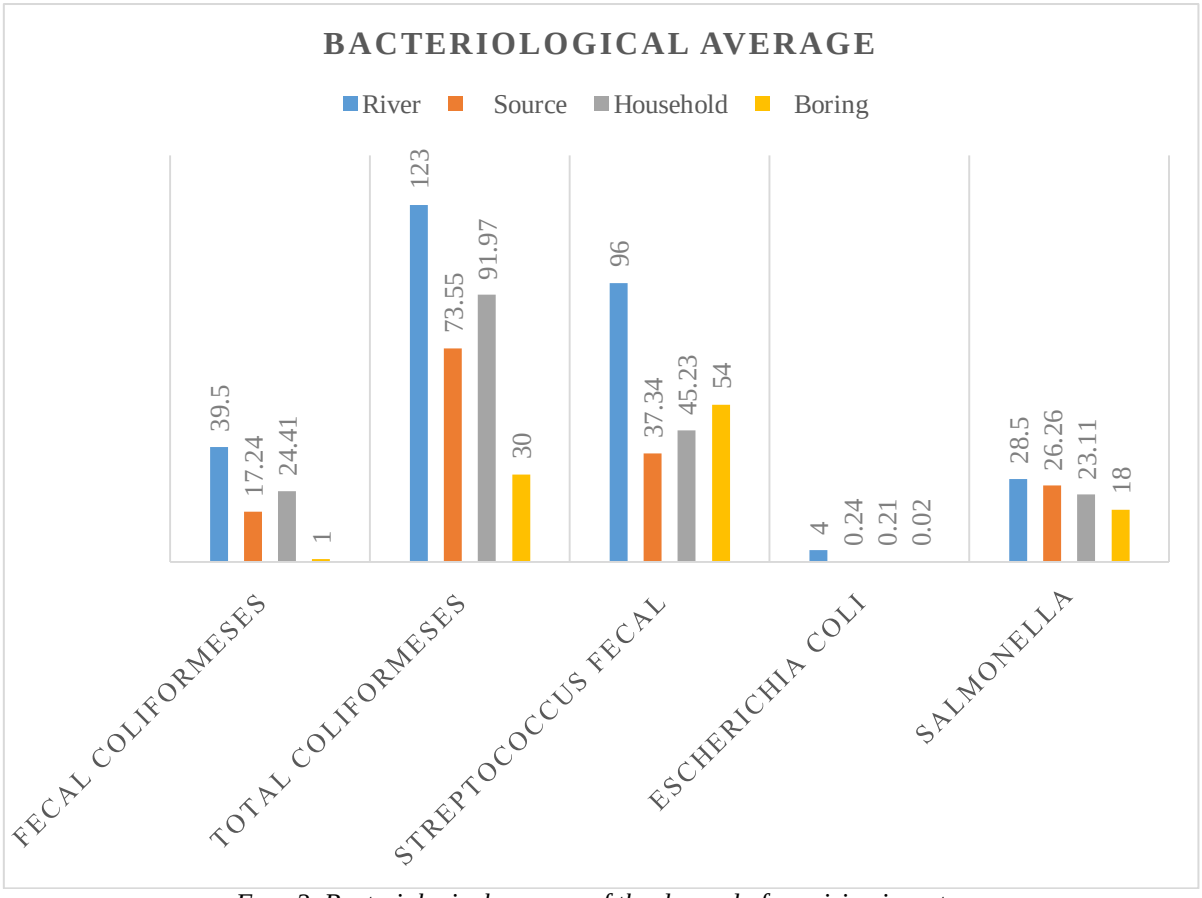
The results of the picture 1 watch that, on 42 dawned of provision in analyzed water, there are only two points that are in conformity with the norms of potability of the WHO and FEACHEM, either 4,8% of the cases.

These results confirm the literature according to which the farming water or perished urban, in tropical or sub-tropical zones, rarely answers instructions of potabilité of the World organization of Health (WHO, 2007).

In the same way, according to the WHO (2019), 2 billions of people in the world use points of water contaminated by fecal matters.

As for what concerns us, these results prove that the climatic change, the increasing shortage of water, the growth and the evolution demographic as well as the urbanization already poses some problems for the systems of food in water. Of 2025, the half of the world population will live in subject regions to the water stress. The retraining of the worn-out waters, to recover the nutriments or the energy, becomes an important strategy (WHO, 2019).

2° Bacteriological average of the dawneds of provision in water



Face 3: Bacteriological average of the dawned of provision in water

The observation of the face 3 shows that the river is contaminated more in nearly all isolated germs that the other types of the points of water analyzed. Globally, these are the total coliformes and the fecal Streptococci that are the most numerous in the waters of the river analyzed. The fecal coliformes and the salmonellas evolve in the same sense for the samples of the aforesaid river, that means that the concentration in fecal coliformes nearly increases with the one of the salmonellas. While the Escherichia coli presents the same concentrations in nearly all types of the points of water analyzed.

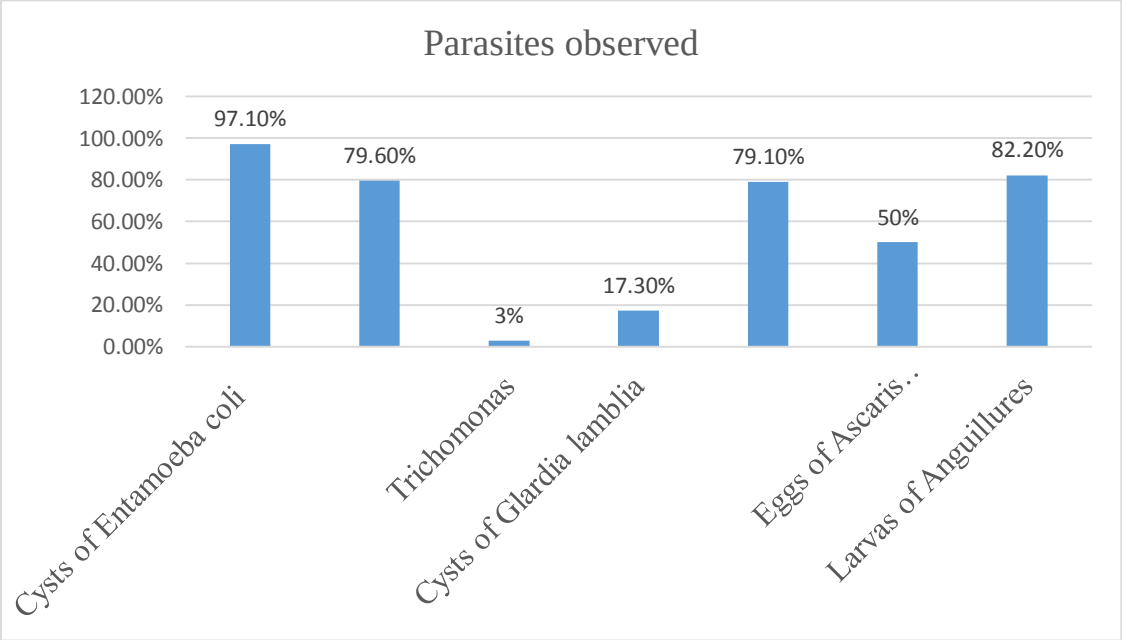
Our results agree with those of Orelien (2017), to Belgium, that found, at the time of his/her/its studies on the quality of water destined to the human consumption in the under-basin pouring of Gullys Devil (Shackle-To-Veal), that the samples of spring water, river and the Berné cistern analyzed presented a concentration raised for all sought-after germs (C. FS, C. TS, S. TS, E.colis and pathogenic germs), and that these waters were not in conformity with the norms of international potabilité of water admitted.

Although a relative difference in density of the measured germs has been noted as the shows the face 3 for the sources and the river, we think that the origin of this contamination is the same. It is probably about the fashion of management of excreted them human and of the stools of animals.

Indeed, more of the half of the population of the riparian regions don't have access to a latrine, and défèque to the free air (on the floor, or even on the very river). Wind and the waters of ruissellement act as agent of transportation of this excreted the receiving environment until the sources and to the river. Otherwise, in the immediate perimeter of these points of provision in water as well as in their distant perimeter, we observed the presence of a lot of animals of raising (caprin, bovine, pork, etc.) that are driven on all sides (upstream, downstream, laterally) of these points of water, and that their excrements, sources of pollution, often taken away by wind and rain, provoke the contamination of these last.

3° Parasites observed

The different types of parasites and their frequency of apparition in the waters of consumption are presented below on the face:



Face 4: Parasites put in evidence in the analyzed waters.

The face 4 shows the presence of five types of parasites: the cysts of the protozoa (Entamoeba coli, *Entamoeba histolytica* and *Giardia lamblia*), the eggs of helminthes (*Ascaris lumbricoides, Ankylostoma duodenal),* the larvas of Anguillule. On 882 samples of analyzed waters, the majority contains cysts of E. coli and of *E. histolytica*, of the œufs of *Ankylostoma duodenal* and *Ascaris lumbricoides*,; including the larvas of Anguillule, either 97,10%; 79,60%; 79,10%; 50% and 82,20% respectively. While the weak proportion has been observed in the cases of cyst of Giardia lamblia and Trichomonas, either 17,30% and 3% respectively.

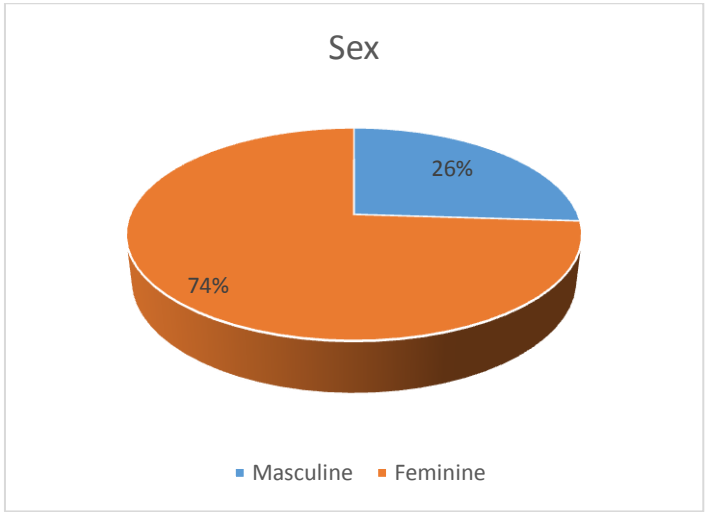
Our results corroborate those of Klutse and his collaborators (1995), in their studies on the elimination of the œufs of nematodes and the cysts of protozoa of the domestic worn-out waters by lagunage to microphytes in zone soudano-sahélienne, where he/it put in evidence the different types of parasites in the raw worn-out waters treated by the experimental lagunage, of which the cysts of *E. coli*, cysts of *E. histolytica*, œufs of *Ascaris lumbricoides*, eggs of *Ankyiostoma duodenal*, and the larvas of Anguillule.

Ellis and al. (1993), put in evidence in waters worn-out ruffians in the Big Cayman, British island close to Brazil, the presence of *Necator americanus*, *Trichuris trichiura*, *Ascaris lumbricoides* and *Giardia lamblia.* Otherwise, the same year (1993), Alouini observed in the waters of entry of the stations by lagunage in Tunisia, of the strong concentrations of *Giardia intestinalis*, active of 30 to 1700 cysts by liter.

In 1995, Grimasons and his collaborators also put in evidence the presence of cysts of *Giardia lamblia* in waters in Eldoret in Kenya and in Mèze in France.

III.2. Socioeconomic Feature of the households (N = 840)

III.2.1. Sex



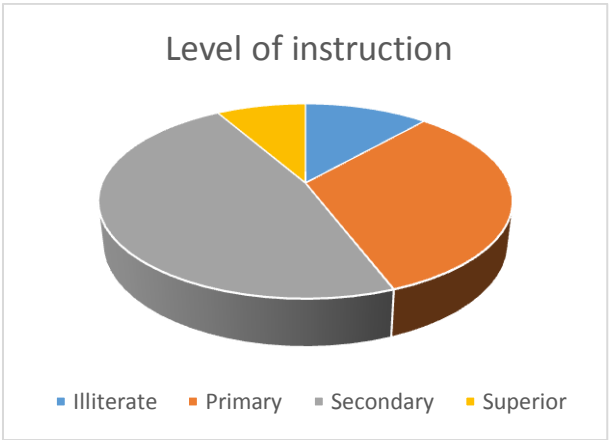
Face 5 : Distribution of them investigated according to the sex

It is evident from the face 5 that, on the set of the individuals interrogated during the investigation achieved in farming environment of the Province of the Tshopo, in RDC, 74% were of feminine sex.

These results corroborate those of Kazadi (2012), that had noted in Kisangani that the majority of them investigated that manages water was of feminine sex.

The frequency raised of the women interviewed in our investigations justifies itself by the fact that in farming environment, in most cases, the domestic works, in this case the compilation of water, are reserved to the women.

III.2.2. Level of instruction



Face 6: Distribution of them investigated according to the level of instruction

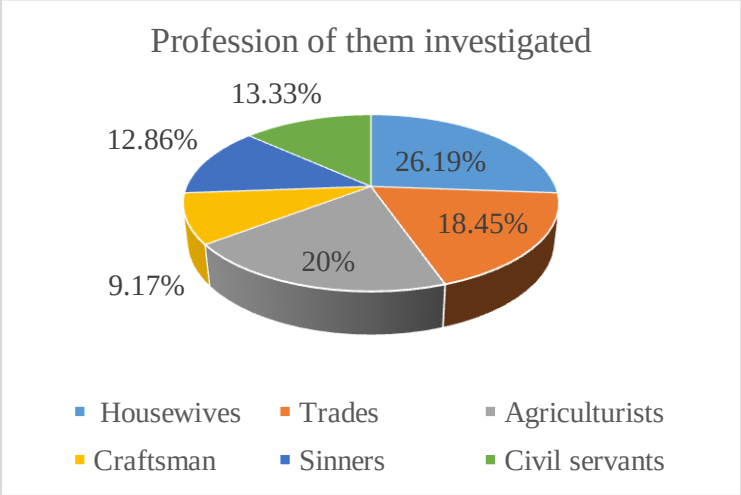
They investigated having the level of the secondary were the more represented (47.50%) and the illiterate (11.55%), as watch the face 6.

Our results compete with those of Sokegbe and al. (2017), to Togo, where they got a rate of instruction of 37,04%, in their analyses on the sanitary risks bound to the sources of drink water in the district n°2 of Lomé-Common, case of the district of Adakpamé.

On the other hand, our results are contrary of those of Kazadi (2012), in the city of Kisangani where he/it notes that the majority of them investigated had the primary survey level.

In our set we think that the rate of illiteracy noted in farming environment in RDC, especially in the province of the Tshopo is one of the factors that would facilitate the exhibition to the risks bound to the consumption of water contaminated. The level of instruction awakens more attention in general to hygiene and to the hygienic quality of the drink water.

III.2.3 Profession



Face 7: Distribution of them investigated according to the profession

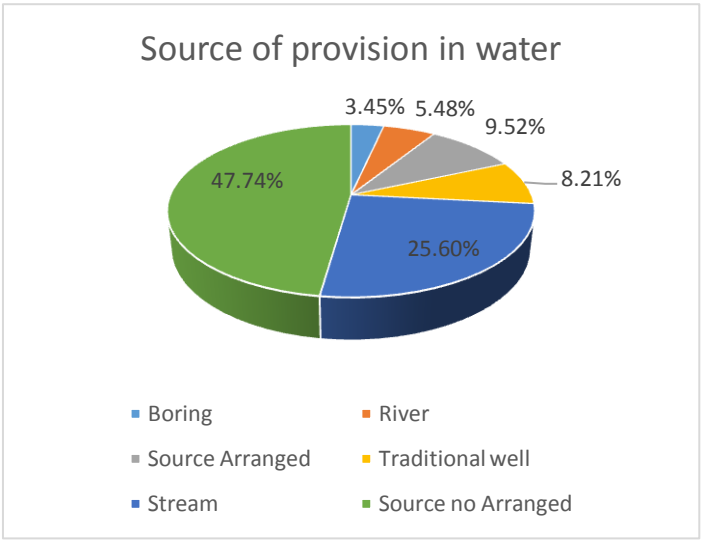
He/it clears himself/itself of the face 7 that, the housewives represent 26,19% of them investigated; consistent of the agriculturists, either 20% of the cases.

Our investigatings are contrary to those of Kazadi (2012) and Sokegbe and al. (2017), that discover in their investigations that most people interviewees were respectively the agriculturists and tradesmen.

As for what concerns us, the rate raised of the housewives is bound to their responsibility to the works of the households. While the differences with the other researchers would be due to the surroundings of study

III.3. Predisposing Factors to the sanitary risks bound to the consumption of water

III.3. 1. Source of provision in water



Face 8: Sources of provision in water of consumption

The face 8 reveals that the majority of the farming households gets a stock in water of the no arranged sources, of the streams and the traditional wells, either 47,74%, 25,60% and 8,21% of the cases respectively. There is only a weak proportion of the farming population that revitalizes himself in water by the arranged sources and in boring, either 9,52% and 3,45% of the cases respectively.

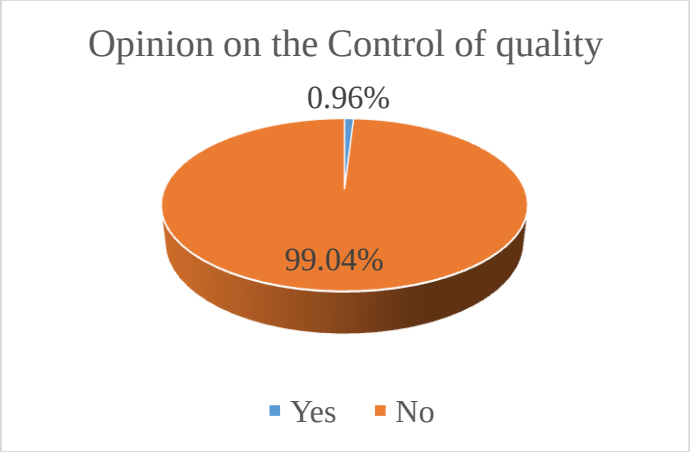
We think like Kazadi (2012) that the choice of the source of provision in water of the households depends on the spatial position of the households in relation to their sites of provision. Indeed, the majority of household resorts to the dawned of water the nearest and easily accessible.

This situation testifies that most works of water of consumption of the villages of the province of the Tshopo are not arranged; and that the few of the sources arranged that don't exist arrive to cover the real needs of the population of the middle. The absence in work of provision in secured water exposes the population to the consumption of water polluted, of which the non arranged sources, the streams, the rivers and the stream, which sources are naturally in the open and exposed to contaminations of all kind, to know: the ruissellement, the

animals, the defecation to the free air; with as consequences the contamination to illnesses to water transmission.

Among those that consume the water of the sources arranged or of the boring, some browse some big distances to his/her/its research; situation that also contributes to the contamination of the water chain.

III.3.2. Control of quality



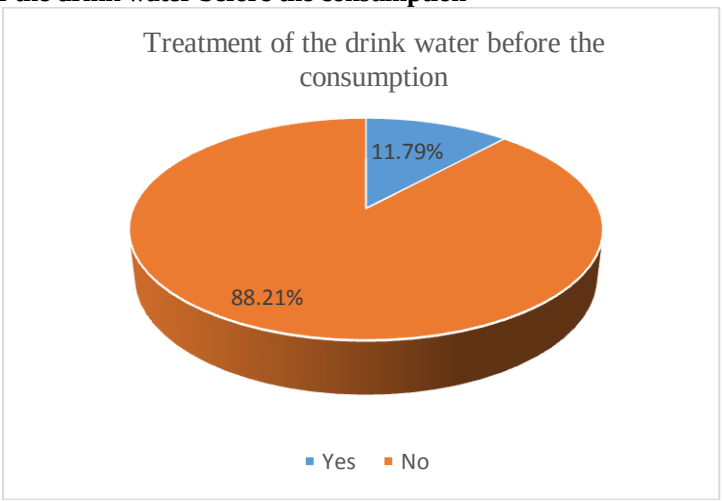
Face 9: Opinion of them inquired into the control of the water quality before the consumption

As one can note it in the face 9, 99,04% of the farming population don't make the control of the quality of the drink water before the consumption, on the other hand, 0,96% only make it.

We made the same report that Sokegbe and al. (2017), in Lomé, to Togo, where most the population doesn't control water before the consumption.

As for us, the weak rate of households that does the control of water quality explains itself by the weak economic standard of living of the farming population, that expresses itself by the financial means lack, but also by the ignorance on the necessity to do the control of water quality.

III.3.3. Treatment of the drink water before the consumption



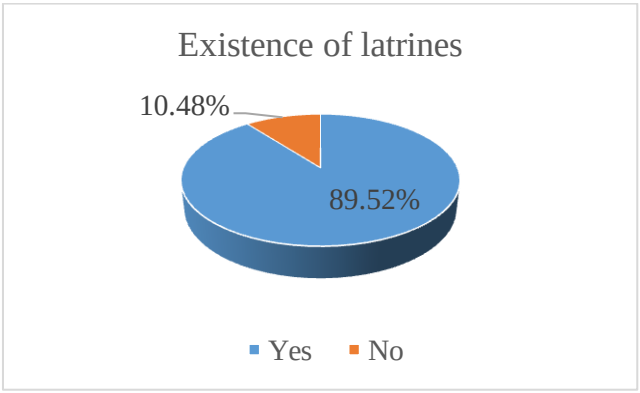
Face 10: Opinion of them inquired into the treatment of the drink water before the consumption

The face 10 shows that the big majority of the farming population of the Province of the Tshopo is not about water before the consumption, either 88,21% of the cases; against 11,79% that treat it.

To this title, our results of investigations confirm those of the investigations led by Kazadi (2012) in Kisangani, where 98,1% of the households of the collectivity sector of Lubuya Bera are not about water before the consumption.

Within sight of this result, we believe that this situation explains itself by the too low socioeconomic level of the farming population, but also by the lack of knowledge on the different methods, easy and less expensive, for the treatment of water at home as the decontamination of water by solar ray.

III.3.4. Existence of latrines



Face 11: Opinion of them inquired into the existence of latrine in the households

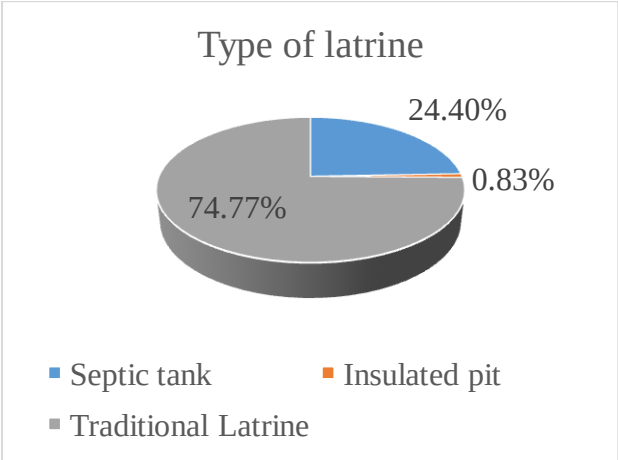
He/it clears himself/itself of the face 11 that the big majority of the households investigated arranges some latrines in the households, either 89,52% of the cases. On the other hand, there is a weak proportion of the households, either 10,48% that don't have some.

According to the Document of Strategy for the Reduction of poverty (DSRP), purification, and the hygiene of water is among the six key priorities of poverty reduction. Some considerable disparities exist between the different statistics mentioned for the levels of purification cover in RDC. According to Water and Sanitation Program (WSP), in 2004, the access to purification was respectively of 8% in the urban regions and 10% in the farming regions, what represents an average of 9%. However, the UNICEF underlines statistics very more raised of 61% in 2001, for the access to hygienic latrines" in the urban surroundings, and of 39% in the farming surroundings, that means a national average of 46% (MISC 2, 2001).

In spite of this presence of the toilets in the households investigated, these last are constructed in a traditional and anarchical way in parcels and don't respect norms of construction on the subject. In most cases, some toilets are overflowed and even nearly full. Situation predisposing to the contamination of the points of water being in some households, and even of the waters of consumption stocked in the households.

Some households simply lack some toilets; it is due to the lack of information on the interest that a toilet represents in the human life.

III.3.5. Type of latrines

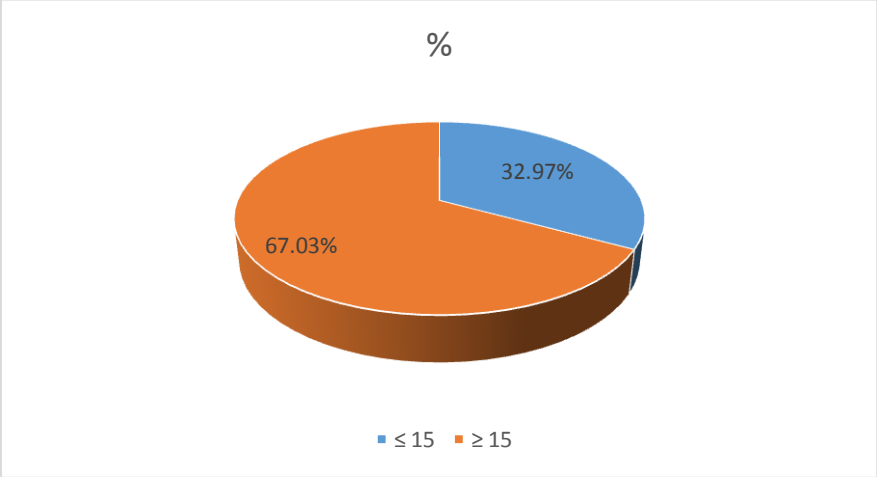


Face 12: Type of latrine found in the households

The analysis of the face 12 shows that, the traditional latrines are the more used in farming environment in the Province of the Tshopo, either 74,77% of the cases.

Thus, the fashion of management and construction of these types of latrines in farming environment is to the basis of the contamination of the consumption water, with as sanitary risks the transmission of the water illnesses.

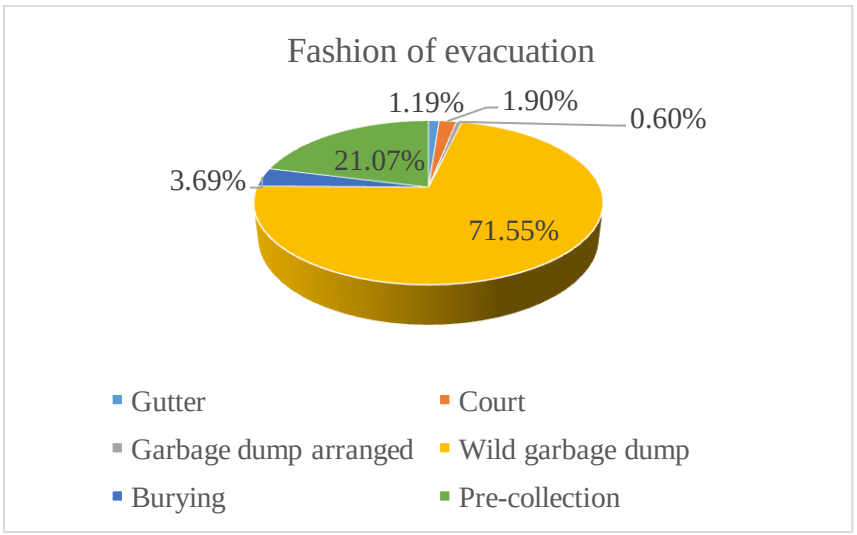
III.3.6. Distance latrine - dawned of provision in water



Face 13: Distance that separates the latrine of the point of provision in water

The face 13 shows that the majority of latrines is situated to more of 15 m of points of provision in water, either 67,03% of the cases; against 32,97% of the those situated unless 15 m of points of water.
In this survey, we noted while the majority of the toilets obeys the norms of Wash-RDC (2014) that indicate that the toilet- dawned distance of water must be located between 30 to 50 m of the latrines; instructions of the WHO fix the minimal limit to 15 m (the WHO, 2003).
We think that the pollution of water due to the latrine depends on the site upstream of this last in relation to the point of water, with as consequence risks it of propagation of the water illnesses.

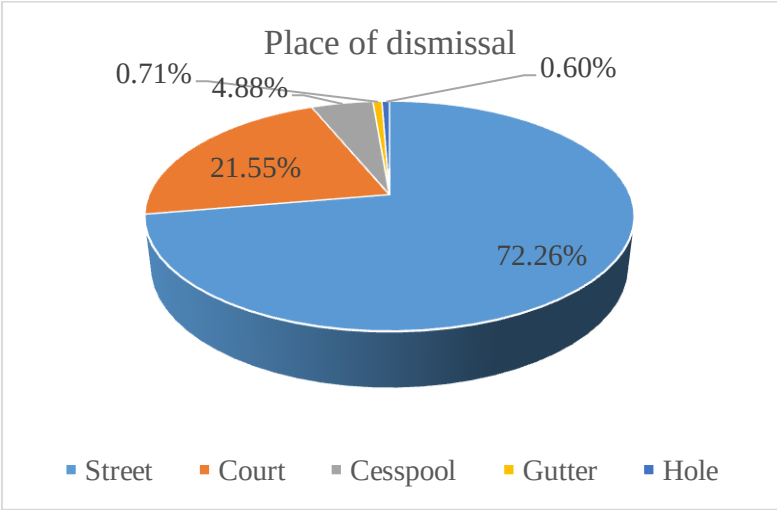
III.3.7. Fashion of evacuation of garbage



Face 14: Fashion of evacuation of the garbage

The results of the face 14 reveal that, most farming households only have wild garbage dumps to evacuate their garbage, either 71,55% of the cases.
The bad management of garbage, the sources of water close to the septic tanks and latrines, the burying of the draining muds in soil is as many the sources of pollution of the watertable, with as consequence, the propagation of the illnesses to water propagation. These reasons join those detected in the studies led by Soro and al. (2010) and El Haissoufi and al. (2011), on the pollution of the underground waters of some districts of Abidjan, that confirms that the fecal pollution of water entails extreme consequences on the survenance of the illnesses to water transmission.

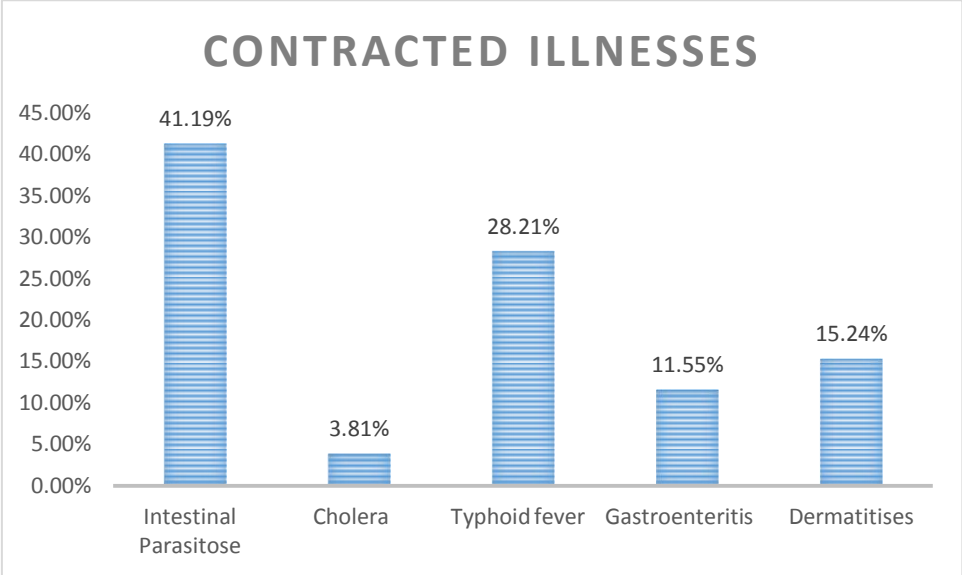
III.3.8. Place of dismissal



Face 15: Place of dismissal of waters used by their users.

He/it is evident from the face 15 that, the majority of the farming population rejects waters used in the street and in the court of the households, either 72,26% and 21,55% of the cases respectively.
The worn-out waters present a direct sanitary risk because of the presence of pathogenic organisms, as bacteria (p. ex., cholera, salmonella, shigella), of virus (p. ex., virus of hepatitis, entérovirus, poliovirus, virus of Norwalk) and of parasites. One counts, as indirect sanitary dangers for the man, the consumption of fish or mollusks made toxic by the presence of bacteria, metals or organic compounds that one recovers in the worn-out waters or the exhibition, during recreational activities, to waters having been the subject of a microbial contamination (Edsall and Charlton, 1996).
Otherwise, the preoccupations raised by international organisms about the elimination of waters used on a world scale, put the accent on the necessity to value the present situation of the dismissals of worn-out waters and their effects on the environment (PNUE, 1995).
In our set, we think that the illnesses to contracted water transmission by our investigated are also the consequences of dismissal of waters used in the human environment.

III.4. Illnesses to water transmission contracted



Face 16: Illnesses to water transmission contracted by them investigated

He/it clears himself/itself of the face 16 that, the intestinal parasitose and the typhoid fever constitute the illnesses to water transmission the more observed at our investigated, either 41,19% and 28,21% of the cases respectively. However, the least proportion has been observed for the other infections, to know: the dermatitises, the Gastroenteritis and the cholera, either 15,24%; 11,55% and 3,81% of the cases respectively.

Indeed, the WHO (2000) esteem to close to 140.000 cases of cholera, having caused 5000 deaths roughly, of which 87% of the cases in Africa (diaye, 2008).

Otherwise, he/it has been noted in the poor countries that, the shigellose constitutes a real public health challenge, it is the most murderous of the illnesses diarrhéiques: she/it kills every year between 700 000 and 1 million people in the world (Ntembue Muambi, 2013).

Also, the two main viruses responsible for sharp viral hepatitises are the virus of hepatitis TO (VHA) and the virus of the E hepatitis (VHE). All two are transmitted by féco-oral way and can provoke big epidemics. Water plays a major role in their transmission. However, they correspond to two different epidemiological models. While the poliomyelitis, that is an infection entérovirale, due to enterovirus poliovirus, distributes itself by contact of man to man, incoming generally in the body by the mouth because of the contamination by stools of water or food (Baziz, 2008).

Since the beginning of the year 2021, the epidemic of the typhoid fever caused more than 360 cases in the Province of Kwango, of which 17 deaths, according to the provincial division of health. Among these cases had 45 complicated cases of intestinal perforations and 17 deaths of it of which 10 postoperative. The patients suffered from abdominal pains, fever, constipation, and sometimes abdominal distending; this epidemic was due to the non access to the drinking water (Jacques Morvan, 2021).

Numerous studies confirm that, among the species of amoeba living in the man's big intestine, only the Entamoeba histolytica is susceptible to trigger an amibiase, because it is the only species that possesses the capacity to cross the mucous membrane of the intestine and to destroy the partition of it, then to eat hématies where it provokes a local necrosis and the ulcers exclusively. This parasite is present under his/her/its shape enkystée in water or the soiled food that are very resistant (Benayada, 2013).

In the same way, the transmission of Giardia makes itself mainly by the ingestion of water or food contaminated by the shapes kystiques of the parasite. One knows currently that it is a parasite, touching 10 to 20% of the populations living in climate moderate and hot, He/it seems that the presence of the Giardias entails some unrests in the absorption of various food or vitamins, if the infestation is little important, it can remain latent. Sometimes, the beginning is brutal, after incubation of 10 to 15 days, with symptoms gastroenteritis aigüs with abdominal pains, distending, nauseas, anorexia, vomitings, and aqueous diarrhea (Benayada, 2013).

In the years 1970, a person out of four in the world was reached of the ascaridiose. This number probably decreased slightly since. One meets it mainly in the tropical countries. The contamination is achieved by the ingestion of œufs of ascaris soiling water the fruits and the vegetables, or by the dirty hands. After having hatched in the digestive tube, the verses reach the liver, the lungs then the spindly intestine, where they become adult, the female laying œufs rejected in the stools. The evolutionary cycle is direct to only one host, the man. The œuf, very resistant, evolves in the outside environment, himself embryonne in three weeks at least, and becomes infectious (Baziz,2008).

According to INTERNATIONAL SOLIDARITY of struggle against the illnesses to water transmission, the natural disasters, the displacement of the populations, the conflicts, the precarious sanitary conditions and the overpopulation, are as many factors that generate important risks for health, bound to the consumption of a non drinkable water and the unsanitary environment (Charlène, 2019).

Emmanuel Rinck (2020) recommends that, to provide services of purification adapted (management of the strong and liquid garbage) is sufficient to fight the illnesses to water transmission, and is urgent that the access to the drinking water and to hygiene.

As for what concerns us, the illnesses to water transmission are caused by the consumption of water contaminated by animal or human stools, that contain pathogenic microorganismes.

IV. Conclusion And Perspectives

This work carried on the sanitary risks bound to the consumption of water contaminated in farming environment of the Province of the Tshopo, in RDC, permitted to provide to the scientific community and all interested a global understanding of the type and the quality of water consumed by the population on a local scale. This survey allowed us to value the socio-sanitary state of the households of the farming population and to know if the consumption of waters contaminated presented a risk for the population of the survey zones. The investigation in the households allowed us to identify the main factors of pollution of the consumption water, in occurrence the bad management of the garbage, of excreted them, of the worn-out waters and the muds of draining. The appreciation of the bacteriological quality of the waters of sources arranged and non arranged, of the rivers and boring showed a contamination to various degrees by the sought-after germs. Thus, the waters of rivers are in majority contaminated by the coliformes and fecal streptococci, but also of the germs due to the defaults of the hygiene rules.

Otherwise, the contamination of these waters constitutes a major risk of the intestinal parasitoses and the typhoid fever for the consumers. In general, the waters of rivers are contaminated more that those of the

other types of points of water. The respect of the hygiene rules and the treatment of water by the populations are to encourage to avoid the intervening of water illnesses.

In perspective, it is interesting and useful to make the analysis of the consumption water before the consumption, every time one notices an unusual color and an unpleasant odor.

However, on the basis of these observations, the urgent measures including the local population, the local authorities, the communal organizations of basis as well as the groupings planters must be considered in the perspective to warn the population of the health risks incurred by the consumption of these waters. In this sense, he/it is important:

a) to undertake a campaign of sensitization and formation on the public hygiene and the operations of water treatment by decontamination (boiling point, chlorination, solar ray, seed of *Moringa oleifera*,…), in order to eliminate the micro-organisms that there is present;

b) to consider making the promotion and the popularization of the personal systems of water treatment at home;

c) to define a zone tampon upstream of the sources of provision in water, in order to protect resources in water from all direct shapes of pollution influenced by the human activities;

d) of rationnaliser the application of the nitrogenous manures in the cultures in order to avoid to increase the content in nitrogen in waters.

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