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All authors' names and affiliations are given after the references

Knowledge, attitudes and practices of the Makala population to biological risks related to water-based diseases in Kinshasa, République Democratic of the Congo

Jean L Lobota, Henry-Jacques M Bomoi, Fiston B Masikini, Poulain B Mulumba, Jackson M Bomoi, Anderson M Munenge, Gladys K Bundu, Fanny K Bakomba, Olivier D Kasanda, Prisca M Kalonji and Jean-Jacques D Amogu

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Abstract

Water is a factor in the contamination of several diseases, because it is a vehicle used by many germs or their vectors. This contamination can occur through contact with contaminated water, as we said earlier. Water-related diseases are a leading cause of poor health among populations in underdeveloped countries. This study is of capital importance as it helps reduce the rate of morbidity and mortality linked to water-borne diseases. It contributes to strengthening the knowledge of populations on preventive measures for water-borne diseases. It was thus an interview survey involving an occasional sample of 500 respondents from the wetlands of the municipality of Makala. It is a working tool in raising awareness among the population and in the fight against this endemic precisely in the commune of Makala in particular and in the city province of Kinshasa in general. It thus constitutes a theoretical framework of reference for future researchers who would like to carry out scientific research in this area.

Keywords: Knowledge, population, measures, preventive, waterborne disease, Kinshasa

Introduction

Water is a vector for many parasites, bacteria or viruses. Precautions should be taken before consuming water in nature.

According to Masikini BF (2023) ^[4], illustrates that accessibility to water in sufficient quantity and quality to satisfy basic human needs is a prerequisite for obtaining a better level of health and sustainable development.

Selemani (2022) ^[10], shows that issues relating to water are also linked to the emergence of water-borne diseases. The number of people suffering from these diseases which are linked to the consumption of unclean water is estimated at 250 million per year. Each year, these diseases claim victims of around 5 and 10 million people, representing approximately 7% of deaths worldwide. The main issues mentioned above also concern the Democratic Republic of Congo, in general, and Kinshasa, in particular.

It is important to note that water is a factor in the contamination of several diseases, because it is a vehicle used by many germs or their vectors. This contamination can occur through contact with contaminated water, as we said earlier. Water-related diseases are a leading cause of poor health among populations in underdeveloped countries.

According to the WHO, (1997), almost half of the world's population suffers from diseases associated with water shortage or contaminated water. It is also exposed to a very high risk of diseases transmitted by water and food, including diarrheal diseases.

According to tells us that the quality and quantity of water have an impact on people's diarrheal diseases through consumption, food preparation, personal hygiene and hygiene in the household.

In fact, households in the wetlands of the municipality of Makala not necessarily having

Corresponding Author:

Jean-Jacques D Amogu

¹Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE - CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

²Department of Biology, Faculty of Science, University of Kinshasa, Kinshasa XI, Democratic Republic of the Congo.

³National Committee for Protection against Ionizing Radiation (NCPRI), Ministry of Scientific Research and Technological Innovation, Kinshasa, Democratic Republic of the Congo

good quality water (Treated) and/or an internal source of supply had the prevalence of water-borne diseases at a certain frequency. Transmission occurs through ingestion of contaminated water, with a pathogen using water as its primary habitat for an essential period of its life. And some of these diseases are linked to the lack of personal hygiene and lack of drainage of stagnant wastewater and the accumulation of garbage in the yard. In summary, the main diseases linked to water are cited in particular as follows: Anemia, Arsenicism, Ascariasis, Diarrhea, Typhoid and paratyphoid fevers, Malaria, Saturnism, Schistosomiasis, Cyanobacterial toxins, etc.

In the Democratic Republic of Congo, waterborne diseases constitute a public health problem but national statistics are not available. Very few studies on waterborne diseases have been carried out there.

In view of the above, we proposed to study the prevention of biological risks linked to water-borne diseases in an endemic context in order to contribute to a better understanding of these pathologies where populations in urban areas of the city of Kinshasa in general, and the commune of Makala in particular, display objects without taking into account notions of hygiene.

The general objective of our study is to evaluate the knowledge of the population of wetlands in the commune of Makala, city of Kinshasa in the Democratic Republic of Congo on the prevention of water-borne diseases.

Achieving this general objective leads us to retain the following objectives:

1. Describe the sociodemographic characteristics of the respondents.
2. Identify the sources of consumption of water intended for drinking.

3. Evaluate the degree of knowledge of the respondents on preventive measures for biological risks linked to water-borne diseases.
4. Address health problems linked to lack of water on the quality of life among respondents from wetlands in the commune of Makala, city of Kinshasa in the Democratic Republic of Congo.

Our study is of capital importance as it helps reduce the rate of morbidity and mortality linked to water-borne diseases. It contributes to strengthening the knowledge of populations in urban areas on preventive measures for water-borne diseases. It is a working tool in raising awareness among the population and in the fight against this endemic precisely in the wetlands of the commune of Makala in particular and in the city province of Kinshasa in general. It thus constitutes a theoretical framework of reference for future researchers who would like to carry out scientific research in this area.

Materials and Methods

Study environment

The study was carried out in Kinshasa in the different wetlands of the municipality of Makala. It is located:

- From East to West between the University and Elengesa Departments.
- From North to South between the By-Pass and Kikwit Directions.

The commune of Makala being one of the communes of the province city of Kinshasa, wetlands are located in the south and center of the commune and more mainly in the Mabulu, Mfidi, Lemba-village, Malala, Salongo, Mavanga, Bahumbu, Bolima, Uele and Selo districts where more than 80,000 inhabitants live.

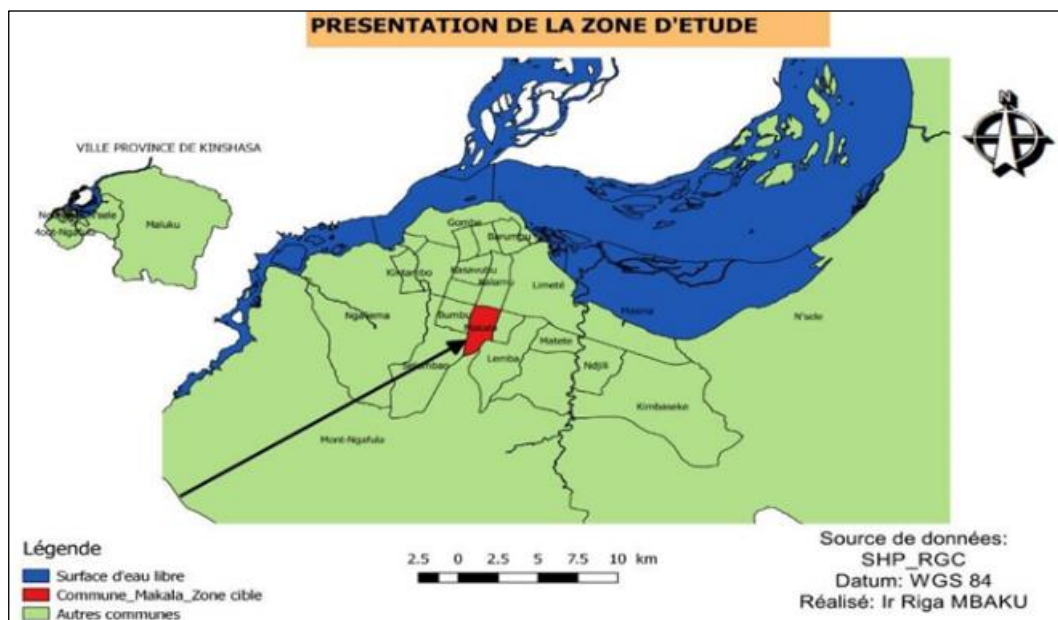


Fig 1: Map of the Location of the Study Area

Data collection

The study was conducted from January 15 to July 15, 2024 (More than six months). The survey was based on our target population which is made up of populations residing in wetland neighborhoods in the commune of Makala, city in the province of Kinshasa in the Democratic Republic of Congo. The data was collected using a questionnaire

(Quantitative survey) and an interview grid (Qualitative survey). The data collected focused on: (i) the socio-demographic characteristics of the respondents, (ii) the sources of consumption of water intended for drinking, (iii) the evaluation of the degree of knowledge on preventive measures for biological risks linked to water-related diseases of the respondents and (iv) health problems linked

to lack of water on the quality of life among respondents from wetlands in the commune of Makala, city of Kinshasa in the Democratic Republic of Congo. The survey was carried out among a sample of 500 respondents chosen randomly. Twenty (20) investigators were previously identified and trained for one day on the basis of their experiences and knowledge on the wetlands of the commune of Makala, city of Kinshasa in the Democratic Republic of Congo, the socio-economic and environmental issues linked to consumption water intended for drinking, the neighborhood to be surveyed and their availability.

Data analysis

The data collected was processed and analyzed with descriptive statistics using SPSS and Excel 2010 software. Some data was disaggregated by gender to be able to detect the percentage of women and young people exposed to biological agents linked to the use and to the consumption of contaminated water.

Limitations of the method used to collect data

It is useful to point out that the methodological approach chosen to carry out this investigation presents a certain number of limitations, notably (i) the size of the sample which does not correspond to the requirements of an in-depth sociological study which would require sampling of up to 10-25% of the population, this being due to financial, logistical and temporal constraints, (ii) the bias tainting the survey and linked to the unavailability of heads of household particularly on working days of the week, to translation difficulties of the questionnaire written in French, and a certain reluctance to answer some questions of a personal nature (Due to incomprehension or fear of retaliation) or considered taboo, and (iii) the lack of information on the epidemiological situation of the Zone of Health of Makala in July 2024.

Results and Discussion

Sociodemographic characteristics of respondents

Our sample consisted of 500 respondents and the characteristics of the latter relate to the variables age, ability to read and write, socio-professional situation, marital status and monthly income. The questionnaire was administered to 320 females (64%) and 180 males (36%).

Table 1: Distribution of respondents according to their age group

No.	Age group (Years)	Sex		Total	
		Female	Male	Total number	Percentage
		Effective	Effective		
1	18 – 25	29	20	49	10%
2	25 – 32	57	24	81	16%
3	32 – 39	59	29	88	18%
4	39 – 46	91	87	178	36%
5	46 - 53	18	19	37	7%
6	53 – 60	48	19	67	13%
Total		320	180	500	100%

Source: our survey (2024)

In relation to the age group of our respondents, we say that it varies from 18 to 60 years old and the majority of which, 79.2%, are under 46 years old.

The age group of 46 to 53 years and 53 to 60 years represent 7% and 13% respectively.

The average age of the respondents is in the class of 39-46 years.

According to Muntibu Blaise *et al.* (2020) [5], explain that the ability to “know how to read and write” does not mean that one has completed a cycle of study attested by a diploma, a patent or a certificate. Table 2 provides us with details on the variable.

Table 2: Ability to read and write (N=500)

	Letter		Illiterate	
	Number (n)	Percentage	Number (n)	Percentage
Male	175	35%	5	1%
Female	295	59%	25	5%
Total	470	94%	30	6%

Source: our survey (2024)

In relation to the respondents' reading and writing skills, we noted the information below:

- The “letter” group represents the largest group with a representation of 94% of elements unlike the illiterate group which only represents 6% of elements.
- The “male” gender is the least literate and represents 1% of the sample unlike the female gender (5%).

We emphasize that these results match those of Sy *et al.* (2014) [8] who underline the parallelism which would characterize socio-economic conditions and levels of education: the more one studies, the more chance one has of having a job which allows one to improve living standards. Figure n°2 shows the socio-professional situation of respondents from the wetlands of the commune of Makala, a city in the province of Kinshasa in the Democratic Republic of Congo, which refers to a work exercise accompanied by a remunerative employment contract in the past. Or currently. The term employed concerns those who have worked or who work under a contract and non-employee means the absence of a remunerative contract.

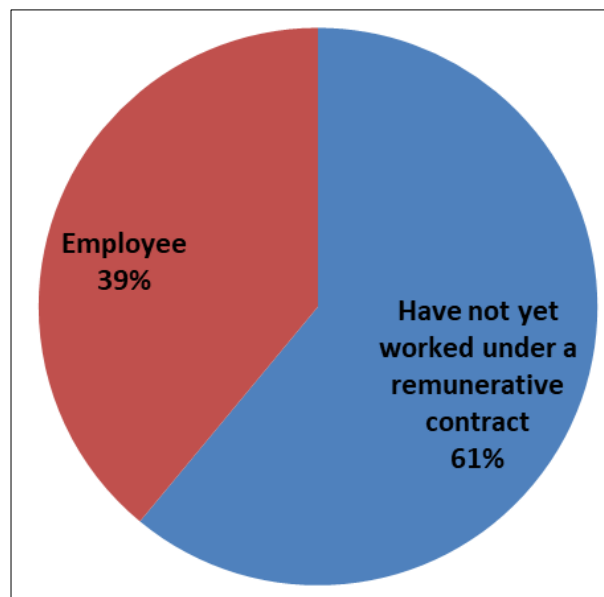


Fig 2: Socio-professional situation of respondents

It appears from this figure that

- 61% or 305 respondents have not yet worked under a remunerative contract.
- 39% or 195 respondents work under a contract according to the elements of our sample.

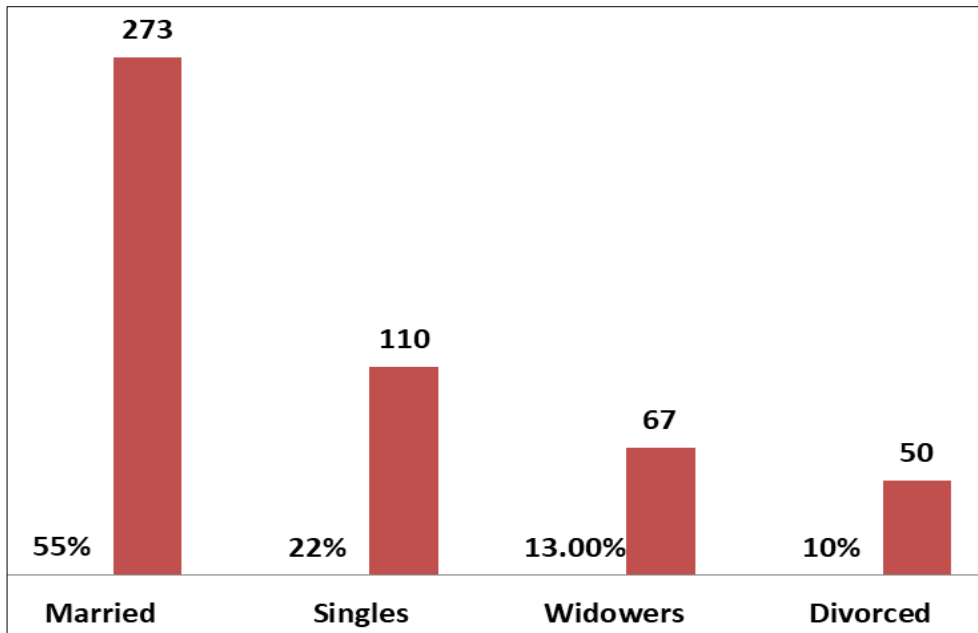


Fig 3: Marital situation of respondents

Figure 3 illustrates the distribution of respondents according to marital status; our respondents are mainly:

- Married (55.0%) or 273.
- Singles (22.0%) or 110.
- Widowers (13.0%) or 67.
- Divorced (10.0%) or 50.

Table 3: Monthly household income in some neighborhoods of Makala in 2024

Neighborhoods\Income	US\$10-50	\$51-100	\$101-200	\$201 and up	Total
	Effective	Effective	Effective	Effective	
Mabulu	6	12	17	24	59
Mfidi	4	27	10	9	50
Lemba-village	23	32	20	10	85
Malala	22	45	2	1	70
Salongo	2	13	27	8	50
Mavanga	5	2	2	1	10
Bahumbu	7	12	2	0	21
Bolima	11	4	3	2	20
Uele	2	34	29	25	90
Selo	2	13	22	8	45
Total	84	194	134	88	500
Percentage	16%	39%	27%	18%	100%

Source: our Survey (2024)

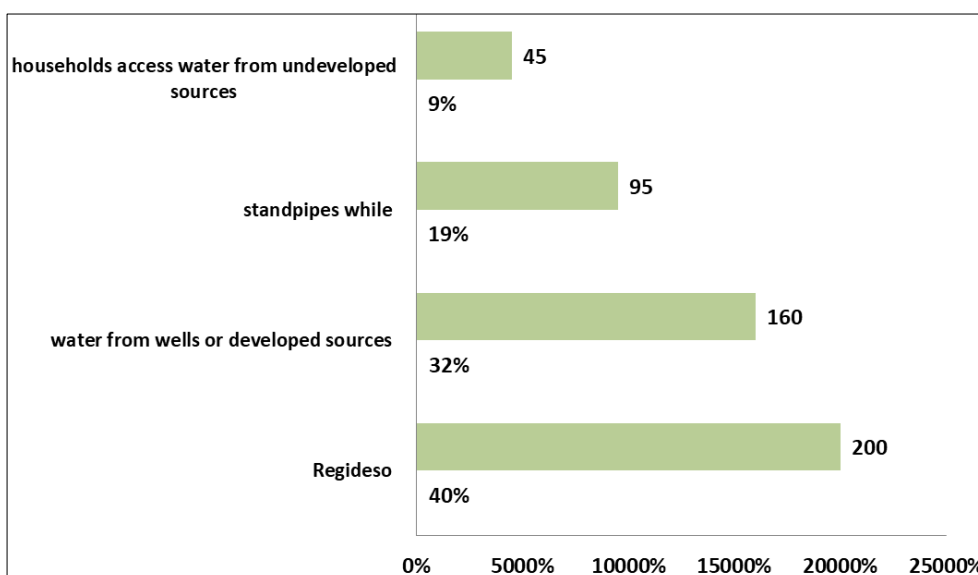


Fig 4: Sources of drinking water supply for some households Makala

This table shows that 39% of households have a monthly income between US\$51 and US\$100, 27% between US\$101 and US\$200 and 16% of households have an income less than or equal to US\$50 per month. Compared to the various data obtained, we see how the level of poverty plaguing the municipality of Makala is truly considerable.

Data relating to the different sources of access to drinking water

Households use several sources to access drinking water. The figure below gives us an exact idea.

Figure 4 shows that 40% of the population uses water from Regideso to obtain drinking water, 32% use water from wells or developed sources generally produced by private services installed at the municipality level, 19% use standpipes while and 9% of households access water from undeveloped sources.

In the same dynamic, a descriptive study carried out by Makoutode *et al.*, (1999) ^[11] in Benin showed the levels of contamination of well water used by the populations of the sub-prefecture of Grand- Popo were beyond the standards of the WHO (Lina Aleke Alex, 2016) ^[3].

Made it possible in a study to determine the safety of stored drinking water through a health survey on access to water among 669 households in the dormitory district of Anonkoi-3 (Abidjan). For this, physicochemical and bacteriological analyzes of water in a simple random sample of 200 reservoirs were carried out in a peri-urban environment in Abidjan from May to October 2010 (Lina Aleke Alex, 2016) ^[3].

We have found that it is useful to point out that during the rainy season, rainwater is generally harnessed to carry out household work. Some households which use water from the Regideso, water from developed springs and standpipes as drinking water, sometimes use water from undeveloped sources for washing dishes, laundry and washing.

In addition, households that do not have sufficient resources to purchase water generally use water from undeveloped sources as drinking water. Their low income does not allow them to bear the daily cost of access to drinking water.

Evaluation of the degree of knowledge of the respondents on preventive measures for biological risks linked to water-borne diseases

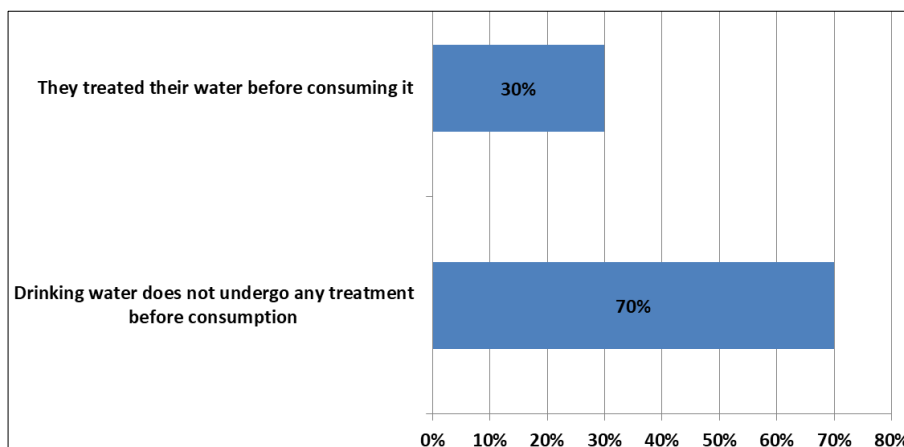


Fig 5: Distribution of respondents according to the treatment that drinking water

Whatever the source of water, drinking water does not undergo any treatment before consumption, in 70% of cases.

Only 30% of respondents said they treated their water before consuming it.

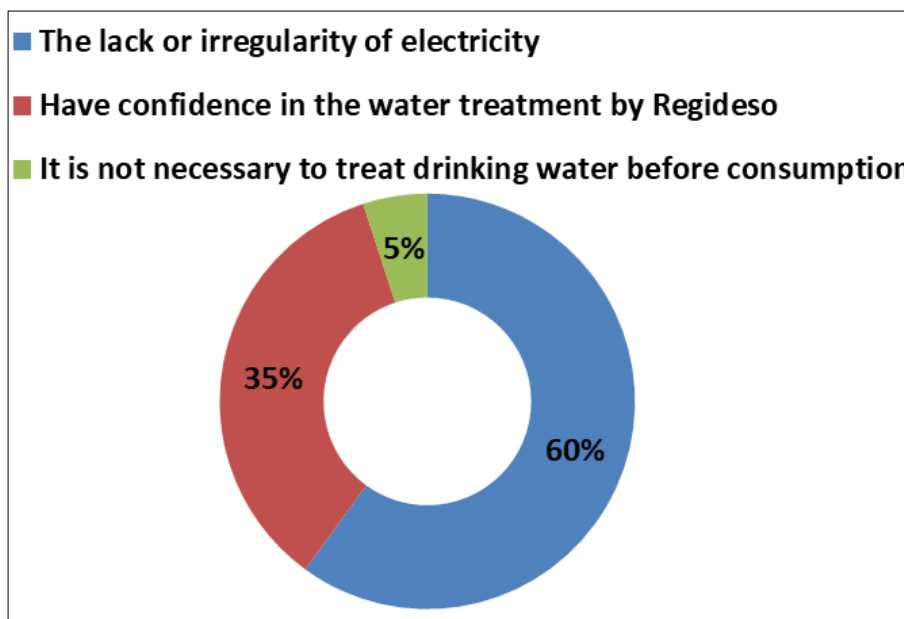


Fig 6: Distribution of respondents according to the reasons given to explain the lack of treatment of drinking water before consumption

The reasons given in Figure 6 to explain the lack of treatment of drinking water before consumption are diverse. For 60% of respondents, the lack or irregularity of electricity is the main reason, while 35% of households say they have confidence in the water treatment by Regideso. It is essential to note that following untimely power cuts, the population of this municipality generally resorts to wood and charcoal as sources of energy.

Finally, 5% of households say that it is not necessary to treat drinking water before consumption. This statement may be due to the lack of information regarding the diseases which result from the consumption of untreated water and especially if we refer to the different sources of drinking water supply as well as the modes of transport and the methods of conservation.

Health problems linked to lack of water on quality of life

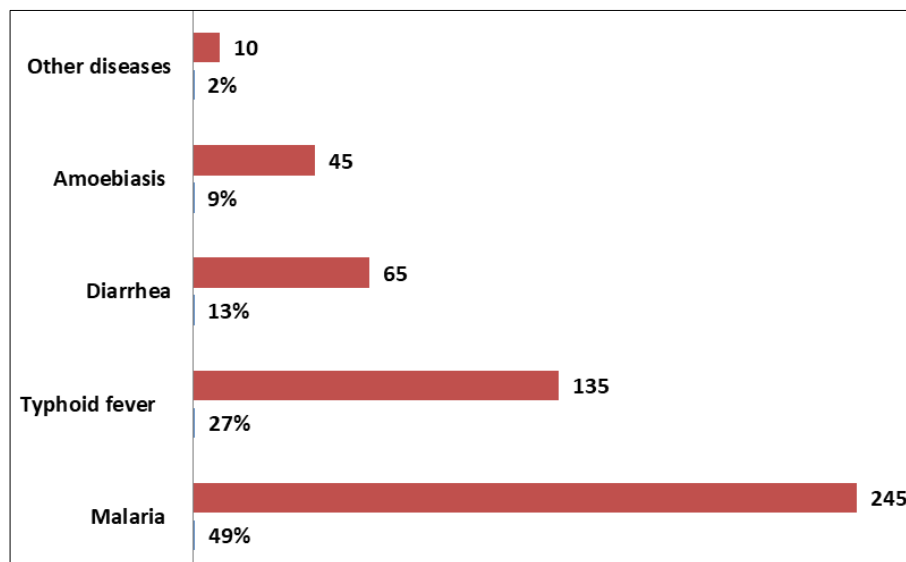


Fig 7: Prevalence of waterborne diseases among wetland respondents of the commune of Makala during the study period

Looking at figure n°7, we see that the lack of water favors the emergence of certain diseases in the region, thus malaria was known to 49% followed by typhoid fever (27%), diarrhea (13%), amoebiasis (9%) and other diseases which represent 2%.

Indeed, the weakness of sanitation measures and individual and collective hygiene conditions seems to have favored the proliferation of mosquitoes including the *Anopheles*, vector of malaria. Indeed, during the rainy season, the holes dug to receive rainwater constitute ideal breeding grounds for the development of disease vectors, particularly mosquitoes. According to the WHO (2010), typhoid fever in the Democratic Republic of Congo is one of the causes of death and morbidity among the population who live in an environment with poor hygiene conditions. And shows that the great responsibility in the context of the disease rests on the population itself in its active participation through the prevention of typhoid fever for the success of the primary health care program. Wherever the rules of personal, environmental and food hygiene are not respected, typhoid fever is experienced regularly and permanently. Excreta thrown here and there accentuates the disease. Handling food without carefully washing hands, crowded houses and promiscuity contribute to the resurgence and spread of this infectious pathology, of which intestinal perforation and hemorrhage remain among the major fatal complications. According to Muntibu Blaise *et al.* (2020^[5]), report that the situation is felt differently depending on whether you find yourself in an area with a steep or gentle slope. Areas with a gentle slope are often marshy and the water stagnates throughout the year, regardless of the rainy season or the dry season in these areas, the risk of contamination of individual wells is very high.

This is the case of the Lemba-village district, where the groundwater table is reached at almost one meter. And with the presence of unimproved latrines, there is reason to fear that gray water will mix dangerously with well water. The lack of water has a considerable impact on health but also on the quality of life of residents.

Conclusion

The objective of this study was to evaluate the knowledge of the population of wetlands in the commune of Makala, city of Kinshasa in the Democratic Republic of Congo on the prevention of water-borne diseases. The discussion sparked by the results of the surveys carried out allows us to conclude:

- That of the 100% of respondents, 36% are men (180) and 64% women (320).
- That economically, we have a low-income population. And if we know that hygiene products and sanitation works as well as access to drinking water induce costs, we can expect that a good part of these households be deprived of these means.
- The majority of households surveyed listed illnesses actually linked to the lack of flow of water from the Regideso. The absence of water has a considerable impact on health but also on the quality of life of residents.
- That malaria (49%), typhoid fever (27%), diarrhea (13%), amoebiasis (9%) and other diseases which represent 2% were cited as the most common health problems. Frequent.
- That the main sanitation problems encountered in the commune of Makala essentially concern the lack of improved latrines, the presence of undeveloped sources and the deterioration of road infrastructure, the lack of

public trash cans, the presence of stagnant water, the lack of materials to combat runoff, the lack of monitoring of municipal hygiene services and the weakness of social cohesion greatly influence the deterioration of the living environment and waste management methods clearly indicate that these practices are responsible for pollution air, watercourses and soil and ignorance of water-borne diseases. Which leads us to affirm that the population of the wetlands of the commune of Makala, city of Kinshasa in the Democratic Republic of Congo have insufficient knowledge on the prevention of water-borne diseases.

It was thus from an interview survey carried out on an occasional sample of 500 respondents from the wetlands of the municipality of Makala, the awareness of the population is really necessary for capacity building and to avoid or limit the risk of biological nuisance in the urban environment as well as studies on the dosages of water intended for drinking in this municipality are essential for a sustainable orientation of the urban environment of the city of Kinshasa in the Democratic Republic of the Congo.

Conflicts of interest

The authors report that there is no conflict of interest.

Authors' contributions

All authors have read and approved the manuscript.

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Jean L Lobota

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Henry-Jacques M Bomoi

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Fiston B Masikini

¹ Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

² John Wesley Methodist University, Department of Public Health, Kinshasa, Democratic Republic of the Congo

³ Cardinal Malula Christian University, Department of Environmental Management, Kinshasa, Democratic Republic of the Congo

Poulain B Mulumba

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Jackson M Bomoi

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Anderson M Munenge

¹ Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

² Cardinal Malula Christian University, Department of Environmental Management, Kinshasa, Democratic Republic of the Congo

Gladys K Bundu

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Fanny K Bakomba

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Olivier D Kasanda

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Prisca M Kalonji

Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

Jean-Jacques D Amogu

¹ Center of Chemical, Biological, Radiological and Nuclear Excellence (CoE -CBRN/DRC), Ministry of Scientific Research and Technological Innovation, Democratic Republic of the Congo

² Department of Biology, Faculty of Science, University of Kinshasa, Kinshasa XI, Democratic Republic of the Congo.

³ National Committee for Protection against Ionizing Radiation (NCPIR), Ministry of Scientific Research and Technological Innovation, Kinshasa, Democratic Republic of the Congo