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Problem of Access to Drinking Water and Associated Health Risks: Case of the Commune of Lukemi in Kikwit

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Abstract: In the Democratic Republic of Congo, more specifically in the city of Kikwit, access to drinking water is unevenly distributed, hence its selective nature. Thus, the populations of the large and famous Commune of Lukemi rely primarily on unconventional sources of supply to meet their water needs. This massive reliance on inappropriate sources of supply affects the health conditions of this population, hence the aim of this study was to identify the different realities related to access to drinking water in the Commune of Lukemi in the city of Kikwit and to inventory the likely health risks associated with it. Our surveys show that out of the 500 sampled households, with an average number of people per household of 8 and an average length of residence in the Commune of Lukemi of 10 years, the majority of the population of the Commune of Lukemi obtains their water from domestic water sources, i.e. 79% of the overall sample, 11% obtain their water from the Régideso facilities where water flows once or twice every two weeks, and 10% of the population, due to a lack of water from the Régideso and the lack of means to obtain their water from domestic water sources, directly use the water from the Kimani-Mani River. The majority of the population, 60% of whom lack the means, transport their own water without resorting to external help. Thirty percent of households rely on external help for a fee of 500 FCFA per container. However, the remaining 10% of households opt for a monthly subscription of approximately 100,000 FCFA per month for a quantity of approximately 10 25-liter containers per day per cart. Young people under 25 years of age make up the majority of this water supply process, at 40%, followed by those between 25 and 35 (30%) and those between 35 and 45 (20%), compared to those aged 45 and over (10%). Pearson correlations showed that age groups correlate significantly negatively with the quantity of water supplied to households and the number of households served, while the number of households served correlates significantly positively with the quantity of water served. In terms of health, we found that 89% of the population of the Lukemi Commune draws its water directly from domestic water sources and the Kimani-Mani River without prior treatment; this population faces many risks, as confirmed by the local epidemiological results. Thus, a series of recommendations were formulated for the population of Lukemi and the relevant authorities.

Keywords: *Access to Drinking Water, Health Risks.*

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I. INTRODUCTION

The major issue that has attracted the attention of the international community in recent decades is access to drinking water, hygiene, and sanitation. Following the DIEPA (International Water and Sanitation Initiative), which ended in 1990 and whose main objective was to provide drinking water to all, in sufficient quantity and quality, it became clear that the expected results were far from being achieved. Since then, the organization of several water forums has revealed the extent of the problems of access to drinking water worldwide, particularly in Central African countries such as the Democratic Republic of Congo. DIEPA (1990).

It is increasingly clear that the issue of access to drinking water has been and remains a global concern. It is in this context that the United Nations has committed to reducing by

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half the percentage of the population without sustainable access to safe drinking water and basic sanitation services in the coming years.

Like many regions of African countries, the situation regarding access to drinking water in the Democratic Republic of Congo is dismal. This is especially true for the country, which, although relatively fortunate in terms of the availability of water resources, is in reality experiencing not only constraints in the area of access to drinking water but also an acute crisis in its supply of this resource (ATLAS OF THE CONGO, 2016).

Indeed, only a small portion of the country's population has access to water and sanitation services. Kikwit is one of the country's cities facing water supply difficulties, despite the numerous policies and strategies implemented across the country, such as the DIEP (Integrated Water and Energy Policy) and the MDGs, and more recently, the SDGs. However, it is clear that despite all these lifesaving initiatives, the situation remains critical on the ground, hence our particular focus on the case of the large commune of Lukemi in the city of Kikwit.

Thus, the main question of this study remains to determine the different realities related to access to drinking water in the commune of Lukemi in the city of Kikwit, as well as the likely health risks associated with them. Based on the general assumption that only a small portion of the country's population has access to water and sanitation services, and the specific assumption that the majority of Lukemi's population suffers from qualitative, quantitative, and socioeconomic problems with access to drinking water and is therefore exposed to waterborne diseases, this study aims to shed light on the problem of drinking water supply in the commune of Lukemi in the city of Kikwit and its social and health constraints.

II. PRESENTATION OF THE STUDY ENVIRONMENT: THE CITY OF KIKWIT

➢ *Administrative Location*

The city of Kikwit is located in the Kwilu province of the Democratic Republic of Congo. It is known for its administrative and economic role in the region. It is governed by a mayor and a municipal council who manage local affairs, including infrastructure, security, and public services. The city of Kikwit was created in 1897 and acquired its city status by Ordinance-Law No. 095/70 of March 15, 1970. Under this status, it is subdivided into four urban communes: Lukolela, Nzinda, Lukemi, and Kazamba. These communes are further subdivided into 17 neighborhoods, as shown in the following table (Ministry of Planning, 2005; CENCO, 2013):

Table 1 Administrative Division of the City of Kikwit

N°	Municipalities	Areas	Neighborhoods	Areas
1	Lukolela	11 km^2	Lunia Mudikwiti Yonsi Bongisa	4 km^2 3 km^2 2 km^2 2 km^2
2	Nzinda	20 km^2	Kimwanga Sankuru Ndeke-Zulu Lumbi	2 km^2 4 km^2 8 km^2 6 km^2
3	Lukemi	27 km^2	Nzundu Misengi ETAC Wenze Ngulunzamba Ndangu	5 km^2 4 km^2 2 km^2 3 km^2 10 km^2 3 km^2
4	Kazamba	34 km^2	Luano 30 Juin Inga	4 km^2 10 km^2 20 km^2

Source: Annual Reports of the Municipalities, City of Kikwit, 2006.

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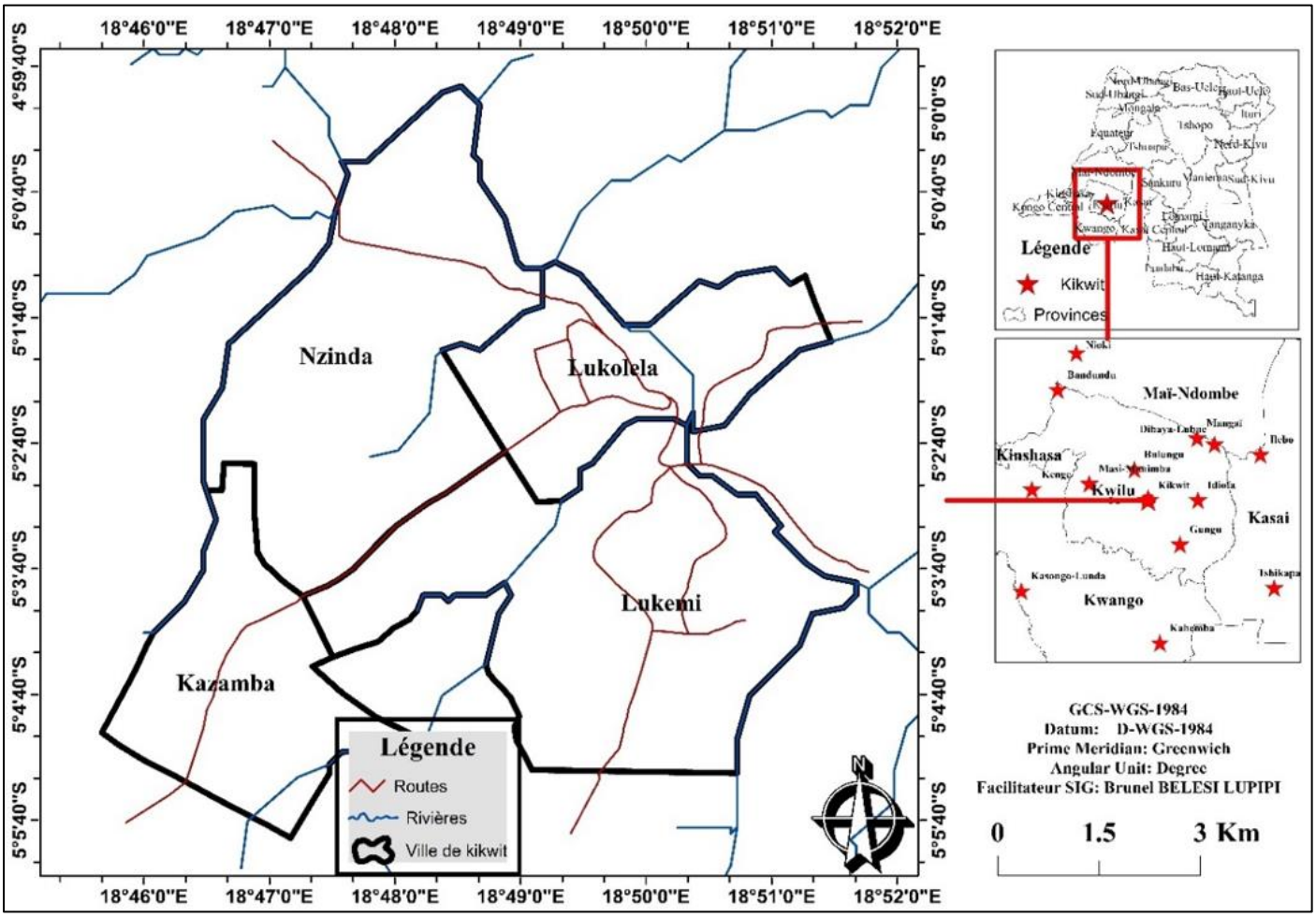

Fig 1 Administrative Map of the City of Kikwit

Only the commune of Lukemi, which includes six neighborhoods compared to four for each of the other communes, is the largest urban entity in the city and encompasses our study area, namely the Ngulunzamba neighborhood.

➢ *Demographic Situation*

The population of the city of Kikwit is estimated at 1,422,898 (see Kikwit City Hall 2023) with a density of approximately 15.5 inhabitants/hectare.

With the transfer of the provincial capital from Bandundu in 1969 and the escalating crisis, the city experienced a significant decline in its growth (Ngondo a Pitshandenge, 2001, pp. XV-XVI). Since the 2000s, the demographic situation has reflected a certain dynamic, mainly due to the youth of the urban population and the significant reduction in diamond activity in Angola and Tshikapa.

Other factors contributing to this dynamism are birth rates and fertility rates.

The birth rate measures the number of births per 1,000 inhabitants per year. It is one of the main demographic indicators. This statistical indicator allows us to measure the demographic vitality of a city or a country. The higher a country's birth rate, the greater the number of children and the younger the population.

The fertility rate depends on the number of women of childbearing age. For the latter, we do not have data that would allow us to analyze it (Mutungu et al., 2021).

Table 2 Population Growth by Major Age Groups from 2020 to 2024

Years	Men	Women	Boys	Girls	Total	Growth index
2020	254144	313466	240506	374912	1252013	100
2021	266160	312314	295041	389043	1262558	108,8
2022	283459	336045	254144	313466	1336896	106,8
2023	288012	151944	266160	312314	1373345	109,7
2024	295990	340919	358055	422505	1417469	113,2

Source: Administrative Data from Kikwit City Hall (2024)

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The data in this table lead us to construct Figure 2, below.

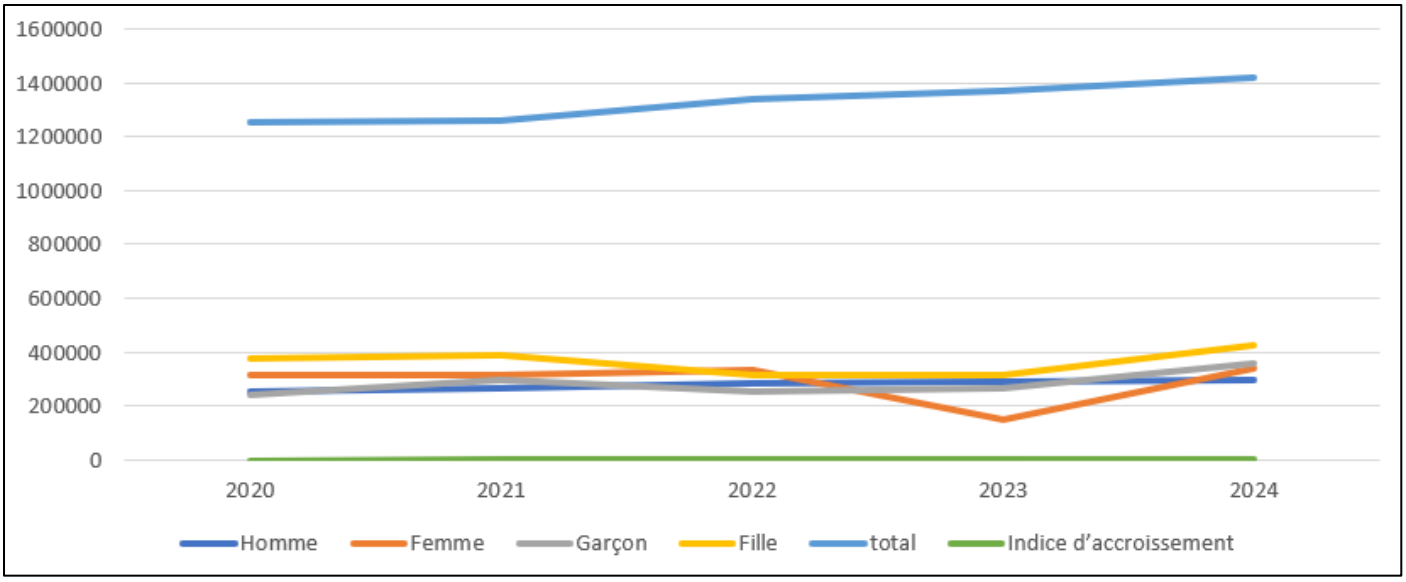

Fig 2 Population Growth in the City of Kikwit

- *Comment:*

In light of the data in Table 7 and its accompanying Figure 1, the following can be noted:

The population of this city is increasing significantly and exponentially, rising from 100% to 113.6% in 7 years, an increase of 13.6%. It is this population increase that is driving the uncontrolled land use and increased demand for drinking water. This rapid population growth is due to high birth rates and uncontrolled rural exodus in the city of Kikwit, as elsewhere in the Democratic Republic of Congo.

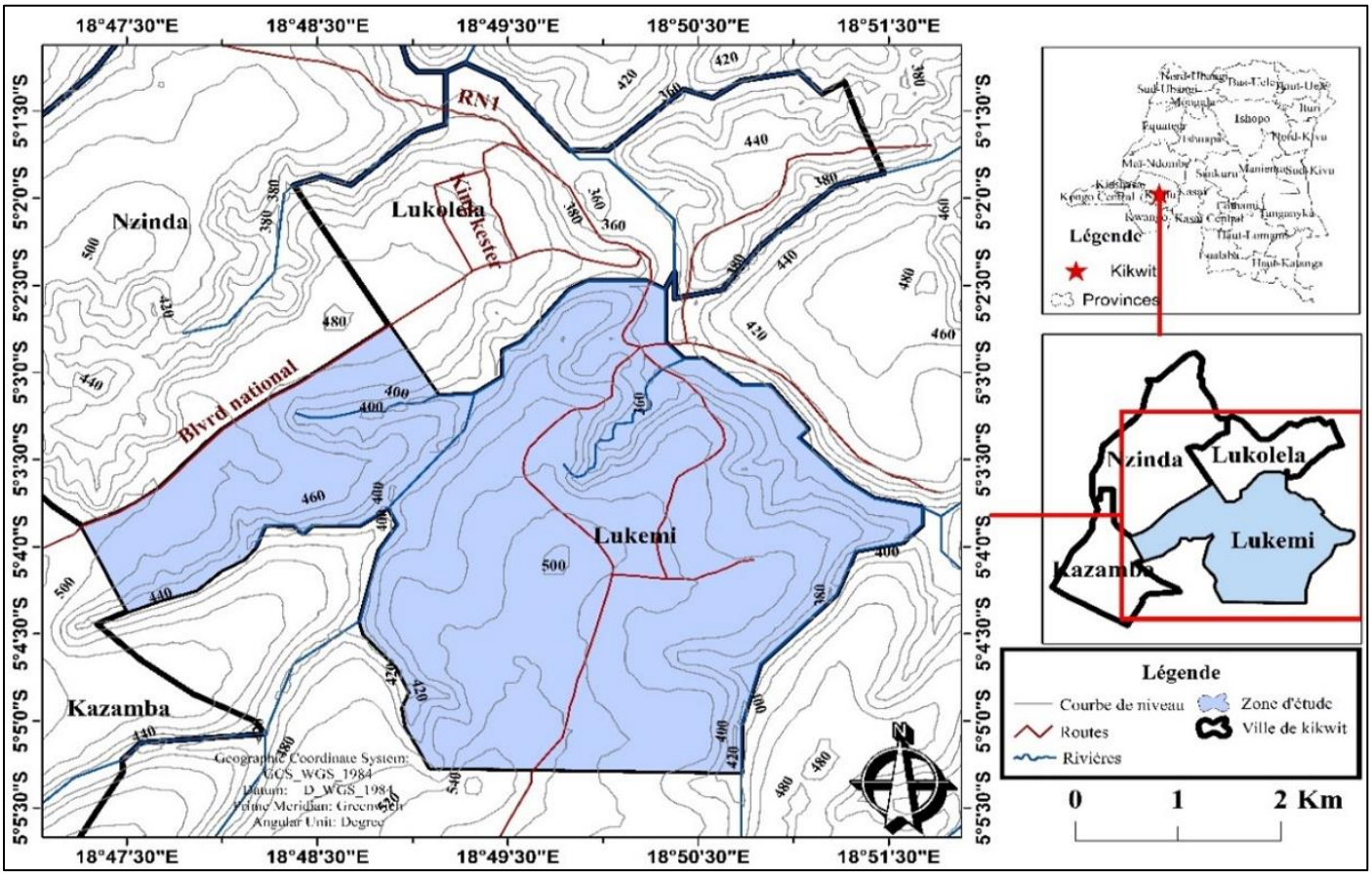

Fig 3 Topographic Map of the City of Kikwit Highlighting the Lukeni Commune

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➢ *Demographic Trends*

The Lukeni commune's demographic trends are growing rapidly, driven by the birth rate and, above all, migratory movements, with waves of populations fleeing the atrocities of the Kamuena-Nsapu militia in Kasai and those of the Mobondo militia in Kwamouth (Mai-Ndombe province). Demographics are also influenced by immigration to Angola and displacement to the mining areas of Kasai. As a result, the authorities are unable to obtain statistics. For example, the Ngulunzamba neighborhood had an estimated population of 60,934 in 2020, including 12,510 men, 14,989 women, 16,510 boys, and 16,925 girls (Neighborhood Office Report, 2021).

- *Drinking Water Supply Sites in the Municipality of Lukemi*

As mentioned above, Lukemi is crossed by several rivers that provide water for residents. Natural springs and wells are also used, although their quality can vary.

Regarding water supply methods, access to a drinking water network is limited to older neighborhoods, which benefit from water points managed by local authorities and NGOs. The REGIDESO network is also very limited, with untreated water. Residents often collect water from rivers or wells, which poses contamination problems. Access issues exist:

✓ Water quality: Water from untreated sources can be contaminated, leading to waterborne diseases, especially since these sources are located in valleys and ravines, where people dispose of their waste. Others are located near latrines.
✓ Remoteness of sources: In some areas, water points are far from homes, making access very difficult.

In short, Lukemi faces water supply challenges, requiring efforts to improve access to quality water resources and appropriate infrastructure.

Photo 1: Illustration of the Regideso Infrastructure in Lukemi

Photo 2: Illustration of the Kamani-Mani River, the Third Main Source of Water Supply after Domestic Water Sources and the Regideso in the Commune of Lukemi

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III. METHODOLOGY AND DATA PROCESSING

As part of this research, it was primarily necessary to conduct field visits to identify the main sites and different modes of drinking water supply for the Lukemi population, as well as other constraints related to this issue in this area, in order to gain a general overview of the evolving situation and its likely health impacts.

➢ *Thus, the following tools and equipment were useful for collecting data during field observations:*

- Research certificate: This university document allowed us to easily access some data, such as: collecting information through direct surveys or questionnaires and organizing interviews.
- A camera: A digital camera for taking pictures of each water supply point;
- A notepad and pen: To record all necessary information or observations;
- ArcGIS, ArcMap, and QGIS mapping software, as well as word processing (MS Word) and graphics (Excel) software, were used and utilized.

IV. RESULTS AND DISCUSSION

Table 3 Number of Households and Source of Water Supply

Number of households	Sources of Supply			
	Domestic sources	Régideso	River Kimani-Mani	Others
500	394	56	50	0
100%	79%	11%	10%	%

Source: Personal Surveys (Thérèse KINDEKE, 2024)

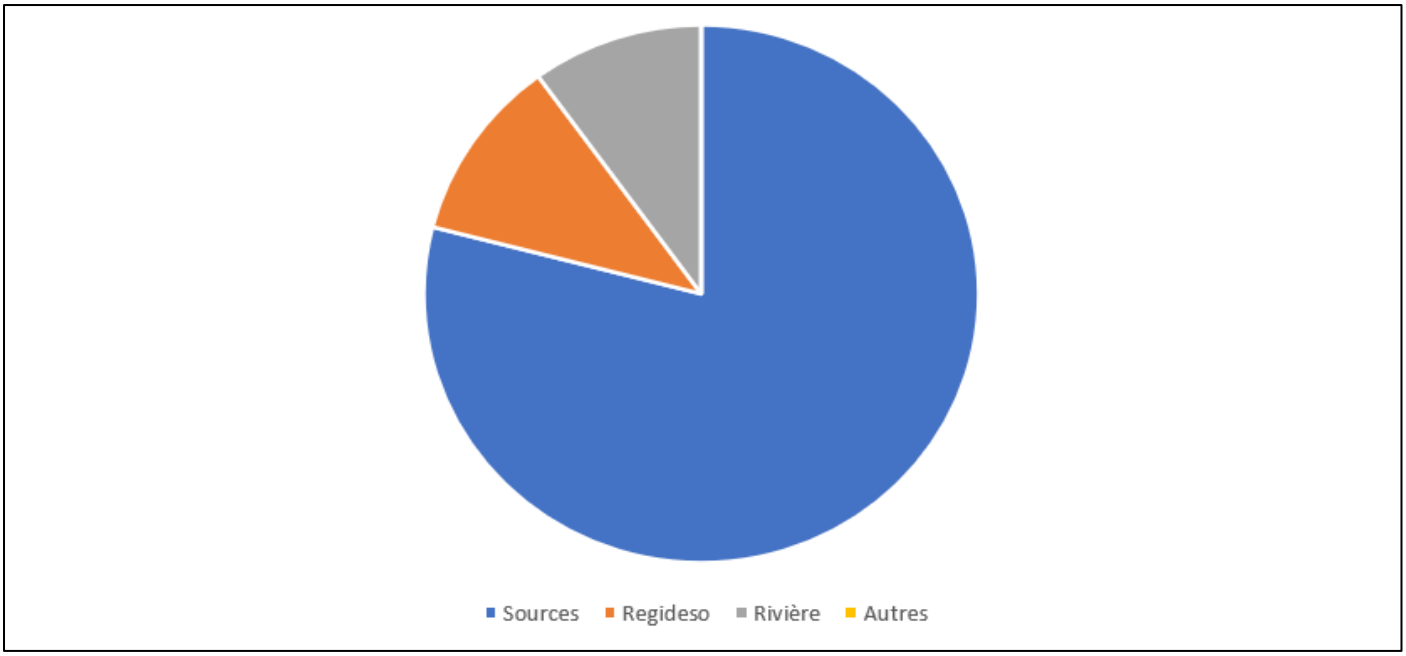

Fig 4 Number of Households and Source of Water Supply

This table shows that the majority of the population of the Commune of Lukemi obtains its water supply from boreholes, with 79% of the population surveyed. 11% obtain their water supply from Régideso facilities, where water flows once or twice every two weeks. 10% of the population, due to a lack of water from Régideso and the lack of means to obtain their water supply from boreholes, directly resort to river water, which is untreated and presents many health risks.

Table 4 Method of Water Supply

Number of households	Transportation by family members	Transport by external individuals	Supply Cart Subscription
500	300	150	50
100%	60%	30%	10%

Source: Personal Surveys (Thérèse KINDEKE, 2024)

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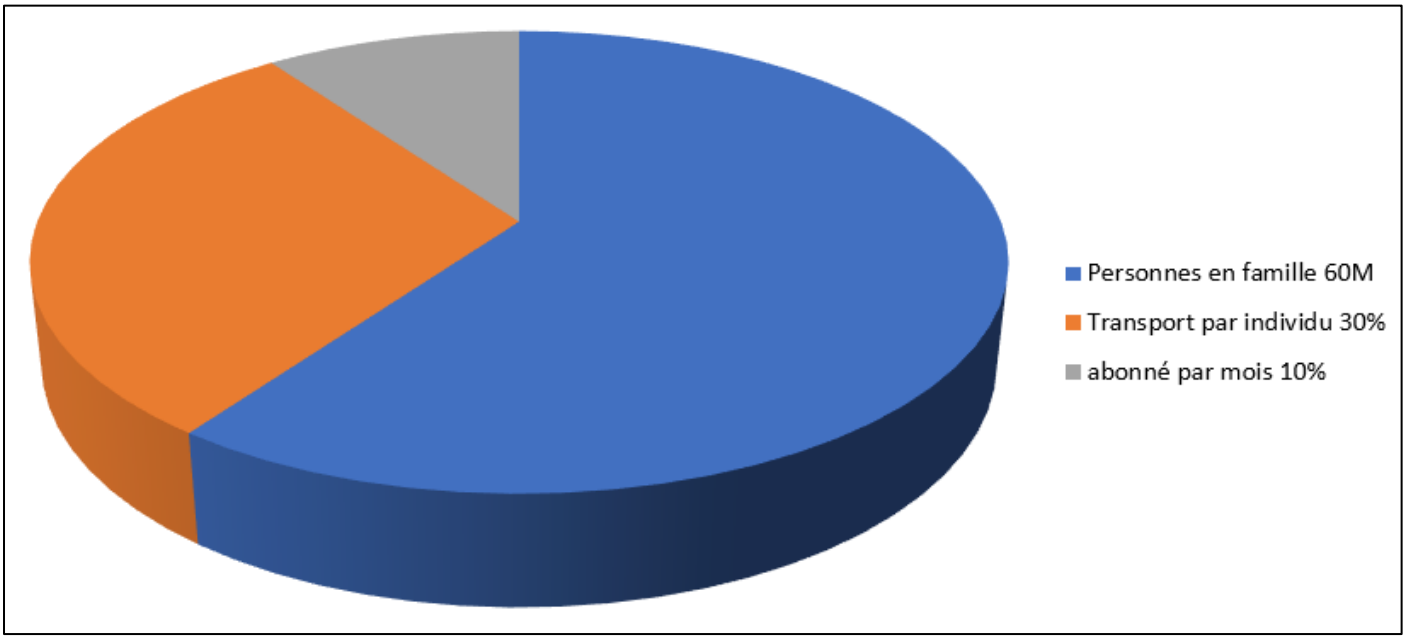

Fig 5 Method of Supply

Regarding the method of transporting water between boreholes, rivers, and homes, the majority of the population (60%) transport it themselves, due to a lack of means, without resorting to hiring an individual outside the family. 30% of households use young people from outside the family to help them transport the containers for a fee of 500 FCFA per container. However, the remaining 10% of households opt for a monthly subscription of approximately 100,000 FCFA per month for a quantity of approximately 10 25-liter containers per day per cart.

Table 5 Average Number of People per Household

Number of households	Average people per household	Average year lived in Lukemi
500	08	10

Source: Personal Surveys (Thérèse Kindeke, 2024)

This table shows that, based on a sample of 500 households surveyed, the average number of people per household is 8, and the average length of time these populations have lived in the municipality of Lukemi is 10 years. This length of time is justified by the fact that the municipality of Lukemi is among the oldest municipalities in Kikwit.

Table 6 Age Range of Respondents

Age group	Predominance per household	%
Under 25 years old	200	40
25 to 35 years old	150	30
35 to 45 years old	100	20
45 years and over	50	10

Source: Personal Surveys (Thérèse Kindeke, 2024)

Regarding the age groups involved in this supply process, young people under 25 make up the majority, at 40%, compared to adults over 40, at 10%.

This reality amply demonstrates the high demand for water use in each household.

Table 7 Quantity of Water Supplied by Age Group and Number of Beneficiary Households

N°	Age group	Supply quantity/day by age group per liter	Average number of beneficiaries (households)
1	Under 25 years old	25000 l	200
2	25 to 35 years old	18750 l	150
3	35 to 45 years old	12500 l	100
4	45 years and over	6250 l	50

Source: Personal Surveys (Thérèse KINDEKE, 2024)

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The average daily consumption per household, equivalent to five 25-liter containers, or 125 liters per day per household, can be verified by dividing the supply quantity per age group by the average number of beneficiary households, resulting in Average Household Consumption (AHC): Qa/Nm.

Where: Qa: Quantity of water supplied per age group

Nm: Number of beneficiary households. Thus, (AHC = 125 liters).

Table 8 Pearson's Order Correlation Between Qa and Nm

	Qa	**Nm**
Qa	1	
Nm	1	1

Source: (Thérèse KINDEKE, 2025)

These data also reveal a significant positive Pearson correlation between Qa and Nm, suggesting that the quantity of water supplied per age group evolves simultaneously with the number of households served. The higher the quantity of water supplied per age group, the greater the number of households served.

Table 9 Pearson Correlation Between Age, Qa, and Nm

	Age	**Qa**	**Nm**
Age	1		
Qa	- 0,94387981	1	
Nm	- 0,94387981	1	1

Source: (Thérèse KINDEKE, 2025)

However, age evolves in a manner contrary to Qa and Nm, hence, as the age group increases, the quantity of water supplied decreases, and the number of households served also decreases, thus justifying a significant negative Pearson correlation between age and Qa as well as Nm.

➢ *Impacts Related to Access to Drinking Water*

After analyzing the above data and observing the situation on the ground, we note that this municipality has experienced a sharp increase in population in recent years, which poses significant problems in terms of equipment, particularly the lack of drinking water. Following our investigations, 11% of the population is connected to Régideso facilities, compared to 79% who obtain their water from domestic water sources for 500 FCFA per 25-liter container, and 10% of the population who obtain their water directly from the Kamani-Mani River in the commune of Lukemi.

➢ *Health Impacts*

We found that a total of 89% of the population in the commune of Lukemi obtains their water directly from domestic water sources and the Kamani-Mani River without first treating their water before consumption. This population thus faces many health risks, as contaminated water and poor sanitation lead to the transmission of diseases such as cholera, diarrhea, dysentery, hepatitis, typhoid fever, and polio. In light of this alarming situation, supported by evidence from field surveys, Lukemi's water supply sources are considered contaminated and unfit for consumption, thus posing a health and environmental hazard.

From the above, health information from the field confirms the hypothesis that a large portion of Lukemi's population suffers from a qualitative, quantitative, and socioeconomic problem in accessing drinking water and is therefore exposed to waterborne diseases, as demonstrated in the table below.

Table 10 Epidemiological Status at the Kikwit North General Referral Hospital, 2010 to 2024

year	**Total population of the commune of Lukemi**	**WATERBORNE DISEASES AT THE KIKWIT SOUTH GENERAL REFERENCE HOSPITAL**											
		Typhoid			**Hepatitis**			**amoebic dysentery**			**Diarrhea**		
		Number of cases	Healed	Death	Number of cases	Healed	Death	Number of cases	Healed	Death	Number of cases	Healed	Death
2020	300618	2333	2000	333	1 130	1 000	130	300	290	10	1 826	1 600	226
2021	309543	800	700	100	1 200	1 050	150	450	350	100	2 500	2 000	500
2022	318456	2 000	1 600	400	2 500	2 100	400	750	550	200	3 000	2 600	400
2023	329874	2 500	2 000	500	3 500	3 000	500	900	650	250	4 000	3 500	500
2024	349154	4 000	3 600	400	4 500	4 000	500	1 000	800	200	4 600	4 200	400

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Total		9 960	8 500	1 460	12 830	11 150	1 680	3 400	2 640	760	15 926	13 900	2 026

Source: Kikwit South Health Zone Central Office, 2024

Based on the epidemiological data from the Kikwit North General Reference Hospital in the table above, we note, first, a very high rate of diarrhea and hepatitis, and finally, amoebic dysentery. These results confirm those found by NGANDOTE et al. (2025) for the Kenge hospitals.

➢ *Socioeconomic Impact*

Public policies in the DRC regarding the provision of basic services have declined. It is true that in the past, various drinking water supply operations were implemented by the state and non-governmental organizations, but currently, it is either the population itself or individuals. From a social perspective, the population of the Lukemi commune is experiencing a disastrous situation regarding access to drinking water, with young people waking up very early every day and traveling long distances to collect it.

From an economic perspective, a 25L container costs 500 FCFA, plus another 500 FCFA for transporting the water. Compared to the standard of living of the neighborhood's population, this situation creates difficulties in the supply of drinking water and forces the population to resort to using raw river water.

V. CONCLUSION AND RECOMMENDATIONS

This study aimed to identify the various realities related to access to drinking water in the Commune of Lukemi in the city of Kikwit and to inventory the likely health risks associated with it. We started from the hypothesis that only a small portion of the country's population has access to water and sanitation services, hence the need to confirm or deny this in the large Commune of Lukemi in Kikwit. Our surveys show that out of the 500 sampled households, with an average number of people per household of 8 and an average length of stay in the Commune of Lukemi of 10 years, the majority of the population of the Commune of Lukemi obtains its water from domestic wells, with 79% of this population surveyed, 11% obtain their water from Régideso facilities where water flows once or twice every two weeks, and 10% of the population, due to a lack of water from Régideso and the lack of means to obtain water from boreholes, directly use water from the Kamani-Mani River. Regarding the method of transporting water between boreholes, rivers, and residences, the majority of the population (60%), due to lack of means, transport their own water without resorting to hiring an individual outside the family. 30% of households use young people from outside the family to help them transport the containers for a fee of 500 CF per container. However, the remaining 10% of households opt for a monthly subscription of approximately 100,000 CF per month for a quantity of approximately 10 25-liter containers per day per cart.

Regarding the age groups involved in this supply process, young people under 25 years of age make up the majority (40%), followed by those between 25 and 35 (30%), and those between 35 and 45 (20%), compared to those aged 45 and over (10%). Pearson correlations showed that age groups significantly correlate negatively with the quantity of water supplied to households and the number of households served, while the number of households served significantly correlates positively with the quantity of water served. In terms of health, we note that 89% of the population of the Municipality of Lukemi draws water directly from boreholes and rivers without prior treatment; this population faces many risks, as confirmed by local epidemiological results.

➢ *Therefore, at Our Level, we Recommend the Following:*

- With regard to the population of the Municipality of Lukemi:
- Ensure hygiene and sanitation measures in their environment to preserve the quality of their available water resources and thus minimize health risks. To the Provincial and National Government
- The State must ensure the strengthening and enforcement of hygiene standards while effectively and responsibly addressing the issue of drinking water supply in the Municipality of Lukemi in order to guarantee the safety and health of the local population.
- Raise awareness among the people of Lukemi of the risks associated with consuming poor-quality water.

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