AFRICAN ENVIRONMENTAL NETWORK

Funded by LEEP

REDUCING THE RISK OF LEAD POISONING IN THE CITIES OF YAOUNDE AND KRIBI, CAMEROON

FINAL REPORT

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December 2025

DISCLAIMER:

This report was produced with funding from the Lead Exposure Elimination Project (LEEP). Its content is the sole responsibility of the author and does not necessarily reflect the views of LEEP.

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EXECUTIVE SUMMARY

This project aimed to reduce the risk of lead poisoning in the cities of Yaoundé and Kribi (Cameroon) by combining a community and digital awareness campaign with a toxicological assessment of drinking water. In total, the intervention reached approximately more than 1,240 people through digital and radio activities, and 355 households were contacted in the field (115 in Yaoundé, 240 in Kribi). Analytically, 115 water samples were collected and tested (15 using a portable photometer and 100 analyzed in the laboratory using ICP-MS).

The main results are as follows: the campaign significantly improved public awareness of lead poisoning, with "good" and "very good" knowledge levels (levels 4 and 5) increasing from 47.06% to 52.94% and from 17.65% to 29.41%, respectively, and 88.2% of respondents reported having adopted at least one preventive measure (hand hygiene, diet rich in iron and vitamin C, stopping the purchase of painted toys, screening). Rapid tests (photometer) indicated "LO" values (< 1 µg/L) for all 15 samples tested. Laboratory analyses showed that all measured concentrations were below the WHO guideline value of 10 µg/L, with an observed range of 0.10 to 3.20 µg/L and an average of approximately 1.05 µg/L. However, approximately 20% of the samples exceed 1.5 µg/L and some critical points (boreholes and wells) show values above 2 µg/L (e.g. SuF007 = 3.20 µg/L; SuP006 = 2.64 µg/L; SuF023 = 2.70 µg/L), suggesting diffuse contamination of some local aquifers or soils.

The immediate operational conclusions are: (1) the acute risk associated with drinking water does not reach the WHO threshold, but cumulative chronic exposure remains a big concern; (2) borehole and well water are priority sources for investigation and monitoring due to their higher lead content; (3) awareness campaigns have a measurable impact on knowledge and behavior and must be continued and expanded. Priority recommendations include extending drinking water monitoring to other districts of Yaoundé, targeted studies on groundwater contamination sources, follow-up campaigns with sampled households, and advocacy to strengthen local technical and regulatory capacities for reducing the risks of lead poisoning from drinking water, particularly from boreholes and wells.

I. CONTEXT AND JUSTIFICATION

Lead is a toxic heavy metal that has long been widely used in industry (paints, batteries, pipes, fuels, etc.). Today, it is recognized as a major environmental contaminant and a danger to human health. Exposure to lead, even at low concentrations, has serious consequences: in children, it causes irreversible neurological damage, reduced cognitive abilities, and developmental delays; in adults, it is associated with hypertension, kidney disease, and cardiovascular disease. Environmentally, lead persists in soil, air, and water, contaminating ecosystems and the food chain.

At the international level, the World Health Organization (WHO) sets the guideline value for the maximum lead content in drinking water at 10 µg/L. For paints, the Global Alliance to Eliminate Lead in Paints recommends a maximum limit of 90 parts per million (ppm). In Cameroon, several texts regulate the use and presence of lead, such as Decree No. 2001/165/PM of May 8, 2001, which sets quality standards for water intended for human consumption, including the limit value of 0.01 mg/L (10 µg/L) for lead; Joint Order No. 006/MINEPDED/MINCOMMERCE of January 24, 2017, prohibits the import, manufacture, and marketing of paints containing more than 90 ppm of lead. Other general environmental protection texts, such as Framework Law No. 96/12 of August 5, 1996, relating to environmental management, insist on the control of hazardous substances, including lead.

Scientific studies, such as those by Tchana (2018), have allowed us to estimate the probability of lead being present in tap water. However, major shortcomings have been observed, including poor control and insufficient regular monitoring, a lack of consumer awareness of the dangers and risks, and risk reduction incentives offered by stakeholders that facilitate lead poisoning. The absence of clear regulations concerning lead in other consumer products (toys, cosmetics, recycled plastic items, etc.) is also highlighted, as is the lack of sufficient technical and institutional capacity to ensure effective monitoring and enforcement of existing standards.

These regulatory and institutional gaps expose the Cameroonian population to a constant health risk and contribute to the degradation of natural environments. Faced with these challenges, it is essential to strengthen local knowledge about lead contamination and assess its real impact. It is with this in mind that this project specifically targets the cities of Yaoundé and Kribi. Yaoundé, the political and administrative capital, has numerous buildings and infrastructure where lead paint is still present, and where the drinking water network's piping dates back to the 1900s, according to interviews with hydrological engineers. Kribi, a rapidly expanding port

city in southern Cameroon, still largely inhabited by indigenous populations, faces increased pollution risks related to maritime infrastructure and rapid urban development. These two strategic cities thus provide a relevant context for analyzing the lead problem and proposing appropriate prevention and management measures.

II. PROJECT OBJECTIVES

1) General Objective

To help reduce the risk of lead poisoning in the cities of Yaoundé and Kribi.

2) Specific Objectives

- Making lead control regulations accessible at the local level through translation and dissemination in local languages
- Obtaining an updated value for the lead content in the water of 100 households in the city of Yaoundé
- Raising awareness among communities via social media about products that may contain lead and proposing ways to limit their impact on human health.

I. METHODOLOGY

1) Areas of intervention

- **Yaoundé (Central Cameroon):** Targeted districts of Yaoundé 6: biyem-assi (Rond-point expresse, superette, TKC), Mendong, Simbock, Etoug Ebe.
- **Kribi (Southern Cameroon):** Kribi 1st district.

Our methodology was subdivided into two parts: awareness-raising and sample collection

2) Awareness

The awareness-raising phase consisted of bringing the message about sources of lead exposure to households and communities. To do this, we used the following mechanisms:

- Awareness campaigns on social media and radio: the development and implementation of this campaign relied on digital communication and awareness tools, namely flyers, awareness messages, and an appearance on Captal FM radio in Yaoundé, which covers the entire city. An evaluation survey was distributed after the campaign to assess the impact of the messages shared.

FIGURE1 :EXAMPLE OF A COMMUNICATION TOOL TO ASSEMBLE WITH MESSAGES

Regarding the publication of awareness-raising tools, we used digital channels such as our Facebook page, LinkedIn, and WhatsApp group. These channels gave us access to a community of over 1,000 people.

- Raising awareness among households in the Kribi 1st district in French and Batangas: we selected 6 young indigenous people in the Kribi 1st district, we shared awareness messages with them to be passed on to households in Kribi 1st and at the same time collected information from these households through a questionnaire.

PHOTOS 1: SHARING AWARENESS MESSAGES AND BRIEFING AWARENESS AND COLLECTION AGENTS

PHOTOS 2 :HOUSEHOLD AWARENESS IN KRIBI 1ST

3) Water sampling and analysis

The initial plan was to assess lead concentration in drinking water from 100 households in Yaoundé, primarily in the Yaoundé 6 district. However, we were only able to sample and analyze 115 households: 100 through laboratory analysis and 15 using a photometer. The following steps were performed for all analyses.

- **Acquisition of an Exact brand smart photometer with rapid lead testing:** This photometer allowed us to perform rapid tests on initial samples to determine their values before sending them to the laboratory. This photometer enabled us to conduct tests to determine the total lead content and the lead soluble in water. The values displayed by the photometer range from 1 to 500 µg/L; below this range, the photometer displays[1]Lo, which means a low lead content.

[1] The complete procedure for this test is detailed in the appendices.

PHOTOS 3: RAPID LEAD-IN-WATER TEST PHOTOMETER

- **Acquisition of sterilized borosilicate glass containers:** These containers allowed us to collect samples in order to perform rapid tests and laboratory analyses.

PHOTOS 4 :BOROSILICATE GLASS BOTTLE

- **Test sample collection:** The collection of tests by trained collection agents took place during the day in 115 households, therefore confidentiality and anonymity clauses were signed through a collection form.

- **Training of sampling agents:** This training session, conducted by a hydrobiologist, took place at the organization's premises and consisted of a review of the lead poisoning problem followed by the sharing of the sampling procedure and coding of samples on sterilized glass containers and the sampling form.

PHOTOS 5 :TRAINING OF COLLECTION AGENTS

- **Transport and analysis of samples**: samples kept cool during and after collection were taken to an appropriate analytical laboratory.

PHOTOS 6: TRANSPORT OF SAMPLES

SAMPLING PROTOCOL:

- **Sample type:**Running water, stored water (reserve water)[2]).
- **Conservation:** Borosilicate glass.
- **Analysis:** Atomic absorption spectrometry (AAS) or portable colorimetric method.

[2]Due to regular water cuts, some households are storing water in containers.

II. RESULTS AND ANALYSIS

1) Results of awareness campaigns

a) Indicators

TABLE 1: INDICATOR OF THE IMPACT OF THE AWARENESS CAMPAIGN

Indicators	Yaoundé	Kribi	Total
Households visited	115	240	355
People affected	+1000	240	+1240
Prior knowledge rate of "Lead Poisoning"	47%	22%	34%
Awareness rate of "Lead Poisoning" after the campaign	53%	-	53%

Observation: Significant confusion has been noted between lead poisoning and other waterborne diseases (typhoid, cholera). The term "lead poisoning" is better understood than "saturnism." The lack of data on the level of awareness in Kribi after the campaign is due to the absence of on-site monitoring and evaluation.

b) Distribution of results

The results are broken down by awareness-raising zone. The awareness-raising efforts were divided into two categories: physical awareness campaigns in Kribi 1st district and digital awareness campaigns using online platforms, also reaching residents of Yaoundé.

c) Impact of awareness on knowledge level

The findings from these campaigns revealed the following:

TABLE 2 : RESULTS OF THE KNOWLEDGE LEVEL SURVEY

	Knowledge Before (%)	Knowledge After (%)
1	5.88	0.00
2	17.65	17.65
3	11.76	0.00
4	47.06	52.94
5	17.65	29.41

The table above shows the variation in the level of knowledge related to the digital and radio campaign carried out during the period from October 19 to 25, 2025.

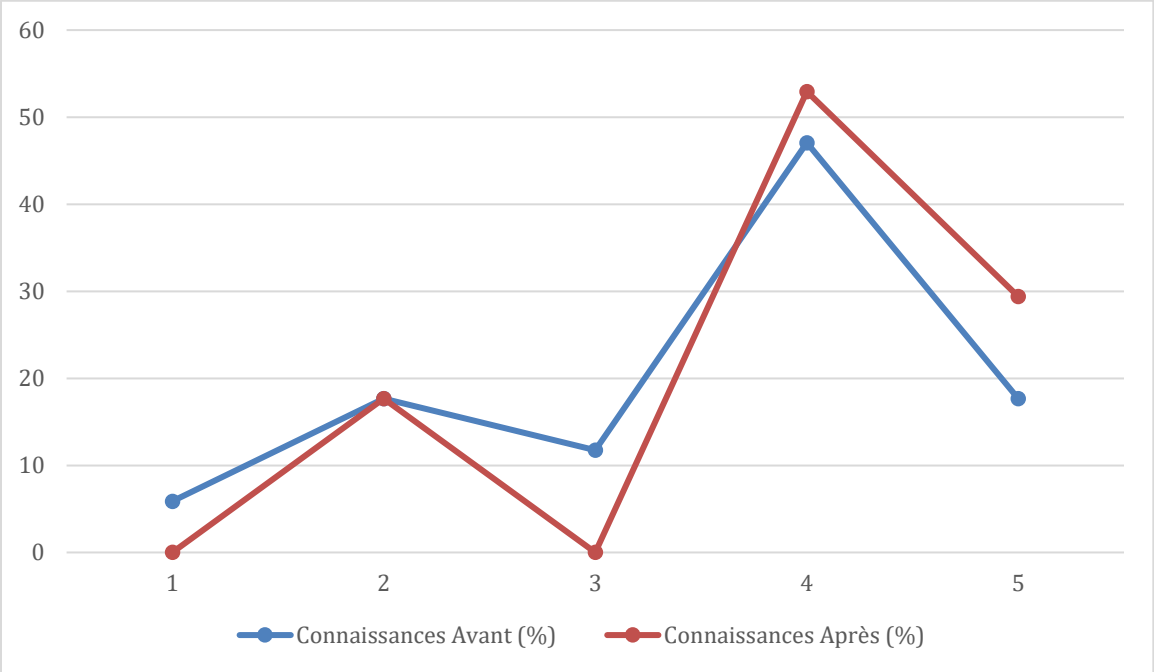

FIGURE 2: ASSESSMENT OF THE LEVEL OF KNOWLEDGE BEFORE AND AFTER THE AWARENESS CAMPAIGN

Figure 2 shows a clear evolution in knowledge about lead poisoning. Indeed, after the campaign, we observe an increase in knowledge about lead poisoning. Certain levels, such as levels 1 and 3, experienced a complete decrease, even reaching zero. This may indicate that after this awareness campaign, those affected are no longer unaware of lead poisoning but are very familiar with this problem, hence the growth at levels 4 and 5, from 47.06% to 52.94% and from 17.65% to 29.41%, respectively.

Impact of awareness on changing paradigms to reduce the risk of poisoning: following this awareness campaign, 88.23% of people started using prevention methods such as: regular hand washing, changing diets by eating foods rich in vitamin C and iron, stopping the purchase of painted toys, keeping the house clean and getting tested.

2) Results of water analyses in Yaoundé

The analysis of lead content in the 115 households was carried out primarily in the Yaoundé 6 district. The neighborhoods of Mendong, Etoug-ebe, Simbock, and the sub-neighborhoods of Biyem Assi were chosen based on their population densities, as they house a large population with mixed water sources. These neighborhoods and sub-neighborhoods, along with their associated water sources, were used to code each household. The household coding system took into account the neighborhood name (Etoug Ebe = ET, Derrière stade la vallée = DSV, Jouvence = JO, Rond-Point Express = TKC, Mendong = ME, Superette = Su, Simbock = Si), the type of sampling source followed by a number describing the number of the sample collected, and the household number within that neighborhood. The water sources identified for sampling in the different households were traditional wells (noted P in the coding), boreholes (noted F in the coding), and the national water distribution company (noted R in the coding); these choices were based on water consumption patterns in the city of Yaoundé. Each household was georeferenced to create a map of the study area as described below.

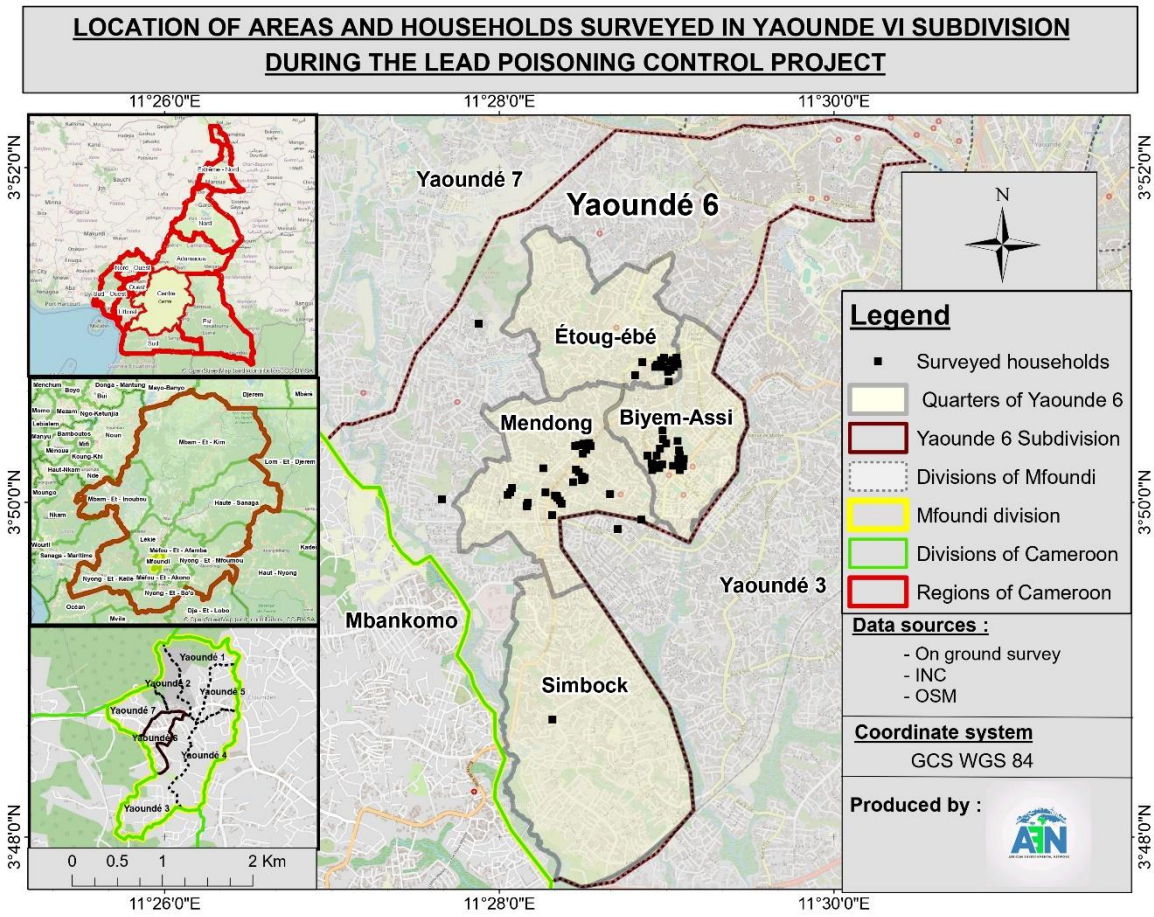

FIGURE 3: SAMPLE COLLECTION AREA

The test results fall into two categories: the results[3]derived from the photometer and the results of laboratory analyses.

a) The results from the photometer:

We analyzed 15 samples using an Exact brand photometer with 6% accuracy, following the procedure outlined in the analysis kit manual. Two tests were performed on the 15 samples: a total lead test and a soluble lead test. All 15 samples showed low concentrations in both tests. Indeed, the rapid test kit displayed "LO" for all tests, indicating a value below 1 µg/L. Therefore, lead was present in trace amounts in these 15 samples.

[3]WHO standard for lead in drinking water: 10 µg/L.

PHOTOS 7: RESULT OBTAINED FROM THE ANALYSIS OF A SAMPLE USING A PHOTOMETER

TABLE 3 : TABLE OF WATER QUALITY ANALYSIS RESULTS BY PHOTOMETER

Samples	Result: Soluble lead	Result of lead
TK-R-34	Low	Low
TK-F-26	Low	Low
TK-R-37	Low	Low
TK-P-28	Low	Low
TK-R-29	Low	Low
TK-R-36	Low	Low
TK-R-25	Low	Low
TK-R-30	Low	Low
TK-R-38	Low	Low
TK-R-33	Low	Low
TK-P-32	Low	Low

TK-R-31	Low	Low
TK-R-39	Low	Low
TK-F-27	Low	Low
TK-P-35	Low	Low

b) Laboratory analysis results:

100 samples were sent to the laboratory for analysis. The analysis was performed by inductively coupled plasma mass spectrometry (ICPM-MS) according to the following analytical protocol:

- **Principle of the method**

The determination of dissolved lead is carried out after acid mineralization of the samples, followed by measurement by spectrometry at a wavelength of 283 nm, in accordance with standardized methods for the determination of trace metals.

- **Sample preparation and spectrometric analyses**

Initially, 30 mL of the sample to be analyzed is taken using clean glassware that has been previously rinsed with deionized water to avoid any metallic contamination.

To this sample, 5 mL of concentrated nitric acid (65% HNO_3) are gradually added. The mixture is then transferred to a hermetically sealed tube and placed in an oven at 40 °C for 24 hours to allow for slow and complete acid digestion.

After digestion, the sample is allowed to cool to room temperature. When the mixture exhibits a dark or orange color, indicating the residual presence of dissolved compounds, it is diluted to 50 mL with deionized water. The mixture is then gently stirred to ensure thorough homogenization.

Before any reading, the instrument is calibrated using standard lead solutions prepared in the same acid matrix. The calibration range is between 0 and 50 µg/L, thus covering the concentration range expected in environmental samples. The calibration curve is validated only if the correlation coefficient is satisfactory ($R^2 \geq 0.995$).

After calibration, 25 mL of the digested solution are taken and introduced into clean, dry measuring cells. The reading is then performed by inductively coupled plasma mass spectrometry (ICPM-MS) at a wavelength of 283 nm, corresponding to the specific absorption wavelength of lead. The measured absorbance is directly converted into concentration using the previously established calibration curve.

The results of the 100 samples are shown below:

TABLE 4 :RESULTS OF SAMPLE ANALYSIS BY MASS SPECTROMETRY

	SAMPLES	RESULTS (µg/L)		SAMPLES	RESULTS (µg/L)		SAMPLES	RESULTS (µg/L)
1	ME-F-01	1.28	35	ME-R-07	0.14	69	ME-R-13	0.5
2	ME-R-02	0.17	36	ME-F-08	1.05	70	ME-R-14	0.19
3	ME-R-03	0.39	37	ME-F-09	1.13	71	ME-R-16	0.19
4	ME-R-04	0.27	38	ME-R-10	0.46	72	MsR018	0.22
5	ME-F-05	0.31	39	ME-R-11	0.31	73	MsF019	1.03
6	ME-F-06	0.9	40	ME-R-12	0.35	74	MsR020	0.1
7	MsR021	0.17	41	JO-R-40	0.31	75	ET-R-06	0.81
8	MsR022	0.2	42	MR-15	0.55	76	ET-R-07	0.75
9	MsR23	0.15	43	ET-R-01	0.92	77	ET-P-08	1.3
10	MoR001	0.7	44	ET-R-02	0.89	78	ET-R-09	0.85
11	MoF038	0.34	45	ET-R-04	1.01	79	ET-R-10	0.9
12	MoF039	0.51	46	ET-R-05	0.84	80	ET-R-11	0.83
13	ET-R-12	1.04	47	ET-F-01	0.41	81	RE-R-6	0.45
14	ET-R-13	0.74	48	ET-P-02	1.06	82	RE-R-7	0.47
15	ET-R-14	0.81	49	ET-F-03	0.2	83	RE-R-8	0.85
16	ET-R-15	0.79	50	RE-R-1	0.54	84	RE-R-10	0.61
17	ET-R-16	0.94	51	RE-R-2	0.29	85	RE-R-11	0.86
18	ET-R-17	0.81	52	RE-R-3	0.41	86	RE-R-12	1.09
19	ET-R-18	0.85	53	RE-R-4	0.21	87	RE-F-06	2.1
20	ET-R-19	0.9	54	RE-R-5	0.75	88	SuR002	0.91
21	SuR003	0.95	55	SuR017	0.79	89	DSVP027	1.4
22	SuP004	2.4	56	SuR014	0.86	90	DSVF028	1.6
23	SuR005	1.4	57	SuR15	1.8	91	DSVR029	0.9
24	SuP006	2.64	58	SuR16	0.99	92	DSVR030	0.81
25	SuF007	3.2	59	SuR17	1.17	93	DSVS031	1.7
26	SuR008	1.05	60	SuR18	0.84	94	DSVR032	1.02
27	SuP009	2.02	61	SuR19	1.05	95	DSVR033	0.96
28	SuP010	2.1	62	SuR20	0.9	96	SVR034	0.77
29	SuF011	2.4	63	SuR21	1.8	97	SVR036	0.84
30	SuR012	0.93	64	SuP22	1.1	98	SVP037	1.85
31	SuR013	0.88	65	SuF23	2.7	99	VSR024	1.1
32	SuF14	0.97	66	SuR24	0.76	100	SVP035	1.2
33	SuF15	2.2	67	DSVR026	0.77			
34	SuR016	1.2	68	DSVR025	0.91			

The table above presents the results of analyses of 100 water samples collected and tested for lead concentration. All observed lead concentrations were positive and ranged from 0.10 µg/L to 3.20 µg/L, with an estimated average of 1.05 µg/L. All measured values were below the WHO guideline value (10 µg/L), but some areas showed relatively high concentrations (>2 µg/L). In other words, the reference guideline value used for interpretation is the WHO guideline value for drinking water: 10 µg/L (0.01 mg/L). The measured values here are expressed in µg/L, with a maximum observed concentration of 3.2 µg/L, which is below the WHO guideline value but still concerning in the context of chronic exposure.

The observed concentration ranges are as follows:

- Minimum: 0.10 µg/L
- Maximum: 3.20 µg/L
- **Estimated approximate average :** ~ 1.05 µg/L
- **General distribution:**
    - Approximately 65% of the samples showed concentrations between 0.5 and 1.2 µg/L
    - Approximately 20% exceed 1.5 µg/L
    - Several critical points exceed 2 µg/L, including:
        - SuF007 (3.2 µg/L)
        - SuP006 (2.64 µg/L)
        - SuP004 (2.4 µg/L)
        - SuF023 (2.7 µg/L)
        - SuF015 (2.2 µg/L)

We note that these samples containing values greater than 2 µg/L originate from drilling and traditional wells, which may indicate soil or groundwater that is already contaminated.

These values, although below WHO standards, indicate widespread and significant contamination, especially considering the cumulative effect of lead in the body, which leads to chronic poisoning. Neighborhoods with several values > 2 µg/L warrant priority monitoring.

III. DIFFICULTIES ENCOUNTERED AND RECOMMENDATIONS

During the execution of this work, we encountered the following difficulties:

- **Logistics: high** cost of customs clearance, scarcity of drinking water
- **Technique:** high overall cost of laboratory analyses limiting sample size, difficulty in obtaining large quantities of containers, high cost of sterilization.

Following this work, we recommend the following points:

- Conduct in-depth research on the sources of contamination of drinking water, particularly those from boreholes and wells
- Extend the study of lead concentration to other districts of Yaoundé in order to have an overview of the risk of lead poisoning throughout the city
- Organize awareness campaigns for households on best practices to reduce the risk of lead poisoning
- To mount an advocacy campaign aimed at adopting measures to reduce the risks of chronic poisoning

CONCLUSION

The study conducted in Yaoundé and Kribi confirms that, although lead concentrations measured in drinking water remain below the WHO standard (10 µg/L), there is widespread, low-level contamination that is not negligible given the cumulative effects of lead on health, particularly in children. The results identify localized pockets, primarily boreholes and wells, where concentrations exceed 2 µg/L and require priority attention. Meanwhile, the awareness campaign has proven effective: it has improved understanding of lead poisoning and encouraged the adoption of preventive measures by a large majority of those affected.

To translate these findings into concrete actions, a three-pronged response is necessary: targeted surveillance, local corrective measures, and capacity building. Surveillance must be expanded both spatially and temporally (more samples, seasonal monitoring) and prioritize identified boreholes/wells. Corrective measures include identifying sources of contamination (soil, building materials, local practices) and proposing appropriate technical interventions (targeted treatment, protection of water sources, sanitation of water points). Finally, ongoing awareness-raising and advocacy with authorities must be strengthened to improve the application of standards, develop regular screening protocols, and mobilize resources for remediation actions. In short, the project has laid a solid foundation through analytical data, community mobilization, and action plans. However, the sustainable protection of the population requires enhanced monitoring, targeted interventions, and sustained institutional coordination.

APPENDICES

Appendix 1: Table of analysis results produced by the analysis laboratory.

AQUAFRIK
Association pour la promotion du développement durable

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Yaoundé, le 23/12/2025

Réf: AAA0295/13/12/2025

Doit: African Environmental Network (AEN)

Objet : Résultats des analyses de cent échantillons d'eau

Paramètre mesuré : plomb

Matrice des résultats

	ECHANTILLONS	RESULTATS (µg/L)		ECHANTILLONS	RESULTATS (µg/L)		ECHANTILLONS	RESULTATS (µg/L)
1	ME-F-01	1,28	35	ME-R-07	0,14	69	ME-R-13	0,5
2	ME-R-02	0,17	36	ME-F-08	1,05	70	ME-R-14	0,19
3	ME-R-03	0,39	37	ME-F-09	1,13	71	ME-R-16	0,19
4	ME-R-04	0,27	38	ME-R-10	0,46	72	MsR018	0,22
5	ME-F-05	0,31	39	ME-R-11	0,31	73	MsF019	1,03
6	ME-F-06	0,9	40	ME-R-12	0,35	74	MsR020	0,1
7	MsR021	0,17	41	JO-R-40	0,31	75	ET-R-06	0,81
8	MsR022	0,2	42	M-R-15	0,55	76	ET-R-07	0,75
9	MsR23	0,15	43	ET-R-01	0,92	77	ET-P-08	1,3
10	MoR001	0,7	44	ET-R-02	0,89	78	ET-R-09	0,85
11	MoF038	0,34	45	ET-R-04	1,01	79	ET-R-10	0,9
12	MoF039	0,51	46	ET-R-05	0,84	80	ET-R-11	0,83
13	ET-R-12	1,04	47	ET-F-01	0,41	81	RE-R-6	0,45
14	ET-R-13	0,74	48	ET-P-02	1,06	82	RE-R-7	0,47
15	ET-R-14	0,81	49	ET-F-03	0,2	83	RE-R-8	0,85
16	ET-R-15	0,79	50	RE-R-1	0,54	84	RE-R-10	0,61
17	ET-R-16	0,94	51	RE-R-2	0,29	85	RE-R-11	0,86
18	ET-R-17	0,81	52	RE-R-3	0,41	86	RE-R-12	1,09
19	ET-R-18	0,85	53	RE-R-4	0,21	87	RE-F-06	2,1
20	ET-R-19	0,9	54	RE-R-5	0,75	88	SuR002	0,91
21	SuR003	0,95	55	SuR017	0,79	89	DSVP027	1,4
22	SuP004	2,4	56	SuR014	0,86	90	DSVF028	1,6
23	SuR005	1,4	57	SuR15	1,8	91	DSVR029	0,9
24	SuP006	2,64	58	SuR16	0,99	92	DSVR030	0,81
25	SuF007	3,2	59	SuR17	1,17	93	DSVS031	1,7
26	SuR008	1,05	60	SuR18	0,84	94	DSVR032	1,02
27	SuP009	2,02	61	SuR19	1,05	95	DSVR033	0,96
28	SuP010	2,1	62	SuR20	0,9	96	SVR034	0,77

Localisation : SIMBOCK-Yaoundé;
Email : aquafrik1@yahoo.com;
Tel: (237) 675838305/696340283/695143558

29	SuF011	2,4	63	SuR21	1,8	97	SVR036	0,84
30	SuR012	0,93	64	SuP22	1,1	98	SVP037	1,85
31	SuR013	0,88	65	SuF23	2,7	99	VSR024	1,1
32	SuF14	0,97	66	SuR24	0,76	100	SVP035	1,2
33	SuF15	2,2	67	DSVR026	0,77			
34	SuR016	1,2	68	DSVR025	0,91			

Protocole analytique de détermination du plomb par spectrométrie de masse (ICPM-MS)

Principe de la méthode

La détermination du plomb dissous est réalisée après minéralisation acide des échantillons, suivie d'une mesure par spectrométrie à une longueur d'onde de 283 nm, conformément aux méthodes normalisées de dosage des métaux traces.

Préparation des échantillons et analyses spectrométriques

Dans un premier temps, 30 mL de l'échantillon à analyser sont prélevés à l'aide d'une verrerie propre et préalablement rincée à l'eau déionisée afin d'éviter toute contamination métallique.

À cet échantillon, 5 mL d'acide nitrique concentré (HNO_3 à 65 %) sont ajoutés progressivement. Le mélange est ensuite transféré dans un tube fermé hermétiquement, puis placé dans une étuve à 40 °C pendant 24 heures, afin de permettre une digestion acide lente et complète.

À l'issue de la digestion, l'échantillon est laissé à refroidir à température ambiante. Lorsque le mélange présente une coloration foncée ou orangée, indiquant la présence résiduelle de composés dissous, celui-ci est complété à 50 mL avec de l'eau déionisée. Le mélange est ensuite agité doucement pour assurer une parfaite homogénéisation.

Avant toute lecture, un étalonnage de l'instrument est réalisé à l'aide de solutions standards de plomb préparées dans la même matrice acide. La gamme d'étalonnage est comprise entre 0 et 50 µg/L, couvrant ainsi l'intervalle de concentrations attendu dans les échantillons environnementaux. La courbe d'étalonnage est validée uniquement si le coefficient de corrélation est satisfaisant ($R^2 \geq 0{,}995$).

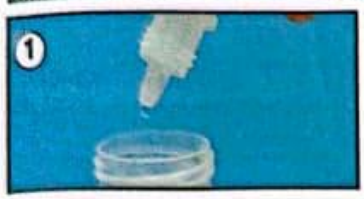
Après étalonnage, 25 mL de la solution digérée sont prélevés et introduits dans les cellules de mesure propres et sèches. La lecture est ensuite effectuée par Spectrométrie de masse (ICPM-MS) à une longueur d'onde de 283 nm, correspondant à la longueur d'onde d'absorption spécifique du plomb. L'absorbance mesurée est directement convertie en concentration à l'aide de la courbe d'étalonnage précédemment établie.

Appendix 2: Image of the photometer and reagents

Appendix 3: Exact photometer analysis procedure.

Total Lead in Water Test Procedure

Uses Reagent Set Part Number 486901



1 PREPARE SAMPLE FOR TESTING
Collect water sample in 50mL conical tube to the 50mL line. Add five (5) drops of ***ACID-1 Reagent, Part #486999.*** Mix and allow to sit for at least five (5) minutes. After this time, TEST SAMPLE is ready for testing.

2 TURN METER ON
Press the ZERO/ON button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.

3 SELECT TEST: Pb
Press and re-press the MENU button until the display shows the parameter Pb.

4 ADD SAMPLE TO CELL
Using the TEST SAMPLE from above, fill and empty the **CELL** four (4) times. Finally, fill cell to capacity with the TEST SAMPLE. Tilt meter forward to allow excess sample to flow out in order to make room for Pb-2 Reagent addition below.

5 ADD REAGENT PB-2
Add five (5) drops of ***eXact® Reagent Pb-2, Part #488375-B.***

6 DIP STRIP & PRESS READ
Dip the ***eXact® Strip Pb-3, Part No. 486997*** into the **CELL** and immediately press READ. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears.** The display will flash (- - -) and begin immediately counting up from **1 to 60.** After the 60 seconds, the meter automatically zeros. The cursor will move across the display followed by **0 µg** (µg/L).

7 DIP STRIP & PRESS READ
Dip the ***eXact® Strip Pb-4, Part No. 486995*** into the **CELL** and immediately press READ. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears.** The display will flash (- - -) begin immediately counting up from **1 to 60.** After the 60 seconds, the cursor will move across the display, informing you that it is about to measure the sample as **µg** (µg/L). Record result (this result is automatically stored in **PB**). After testing is complete discard sample and rinse cell at least three times with clean water.

Soluble Lead Test Procedure

Collect water sample in 50mL conical tube to the 50mL line. Add two (2) drops of eXact® Reagent Pb-2, Part #488375-B. TEST SAMPLE is ready for testing. Turn meter on and select test menu PB. Using the TEST SAMPLE from above, fill and empty the CELL four (4) times. Finally, fill cell to capacity with the TEST SAMPLE. Then perform steps 6 and 7 from above.

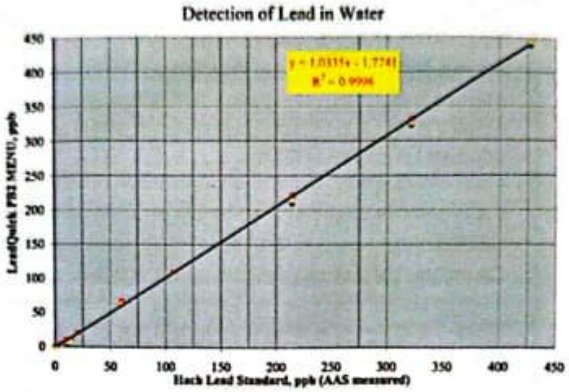
To get results as Colloidal Lead, subtract the Soluble Lead value from the Total Lead value.

11

eXact® LEADQuick Accuracy

Hach® Lead Standard Solution, 10 mg/L as Pb^{2+} (Cat. 23748-20) was verified by Atomic Absorption and used with the eXact® LEADQuick™ Meter, PB MENU to confirm precision and accuracy.

Hach® AAS, Lead Std, ppb	Meter 1 PB MENU ppb	Meter 2 PB MENU ppb	Average PB MENU ppb
0	0	0	0
5	4	4	4
10	6	10	8
10.7	6	10	8
14	10	10	10
20	18	20	19
60	63	67	65
107	110	110	110
214	209	221	215
321	322	331	326.5
428	436	451	444.5



Available reagents / Reorder information

PARAMETER / TEST	PART #	RANGE (µg/L)	±% BEST ACCURACY	# OF TESTS
Lead in Water	486901	1 – 500	6	50
Mercury in Water	486901	10 – 600	6	50
Cadmium in Water	486904	10 – 600	6	50
Dilution Kit	487200	N/A	N/A	N/A

Visit us online: **sensafe.com/leadquick**
for up–to–date product information.

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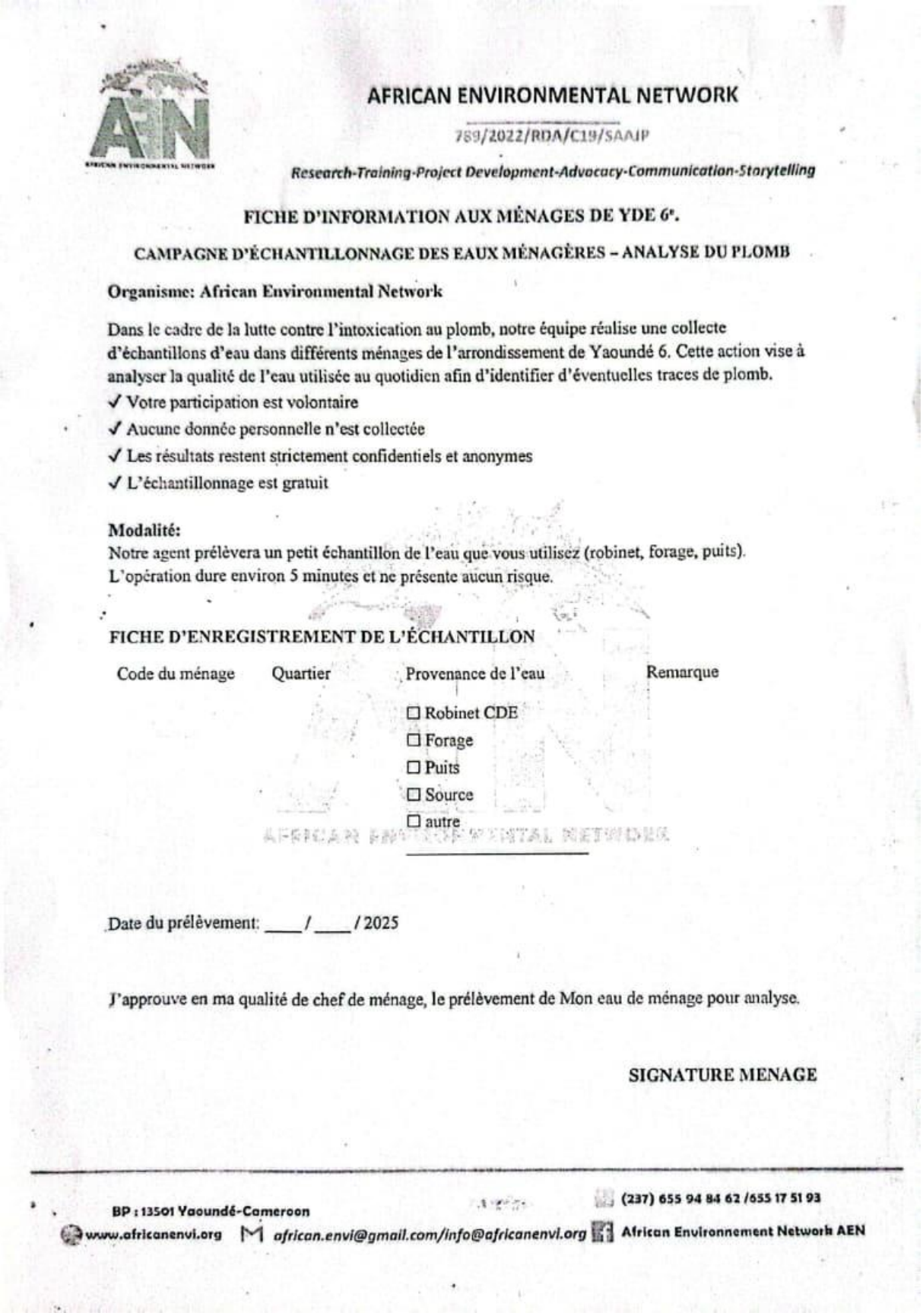
Innovators of Water Quality Testing

Revision 06/13/2019

Appendix 4: Example of a sampling form



AFRICAN ENVIRONMENTAL NETWORK

789/2022/RDA/C19/SAAIP

Research-Training-Project Development-Advocacy-Communication-Storytelling

FICHE D'INFORMATION AUX MÉNAGES DE YDE 6e.

CAMPAGNE D'ÉCHANTILLONNAGE DES EAUX MÉNAGÈRES – ANALYSE DU PLOMB

Organisme: African Environmental Network

Dans le cadre de la lutte contre l'intoxication au plomb, notre équipe réalise une collecte d'échantillons d'eau dans différents ménages de l'arrondissement de Yaoundé 6. Cette action vise à analyser la qualité de l'eau utilisée au quotidien afin d'identifier d'éventuelles traces de plomb.

✓ Votre participation est volontaire
✓ Aucune donnée personnelle n'est collectée
✓ Les résultats restent strictement confidentiels et anonymes
✓ L'échantillonnage est gratuit

Modalité:
Notre agent prélèvera un petit échantillon de l'eau que vous utilisez (robinet, forage, puits).
L'opération dure environ 5 minutes et ne présente aucun risque.

FICHE D'ENREGISTREMENT DE L'ÉCHANTILLON

Code du ménage	Quartier	Provenance de l'eau	Remarque
		☐ Robinet CDE ☐ Forage ☐ Puits ☐ Source ☐ autre _____	

Date du prélèvement: ____ / ____ / 2025

J'approuve en ma qualité de chef de ménage, le prélèvement de Mon eau de ménage pour analyse.

SIGNATURE MENAGE

BP : 13501 Yaoundé-Cameroon (237) 655 94 84 62 /655 17 51 93
www.africanenvi.org african.envi@gmail.com/info@africanenvi.org African Environnement Network AEN