Analysis of the water quality risk index for human consumption in urban areas of the department of Bolivar

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Abstract: Objective: To analyze the results of the Water Quality Risk Index for Human Consumption in Urban Areas of the Department of Bolivar. Materials and methods: A descriptive investigation was developed, with the objective of evaluating the compliance of the physical, chemical and microbiological characteristics of water for human consumption. The direct observation technique was used whose results are based on the application of the standardized measuring instrument authorized by the Ministry of Social Protection in Colombia - IRCA for estimating compliance with acceptable parameters established in current regulations. Results: It was found that of the 46 municipalities in the department of Bolivar, study focus 18 presents water that is not suitable for human consumption that requires special surveillance and 3 municipalities have sanitary waters that require maximum, special and detailed surveillance. Conclusions: The need to establish alternatives by the competent entities that improve the quality of water for consumption in some municipalities of Bolivar and implement strategies for the prevention of waterborne diseases was evidenced.

1. Introduction

United Nations Human Rights [1] Affirms that water is the essence of life. Drinking water and sanitation are essential for life and health, and fundamental for the dignity of every person [2]. Expresses that the right of all persons was mentioned worldwide for the first time to have access to drinking water in sufficient quantity, and the evaluation and use of water resources in the world for the assurance of the well-being of the people was discussed, as the states were encouraged to carry out internal reviews on water matters to establish plans and policies focused on meeting the needs of drinking water and sanitation. The United Nations General Assembly explicitly recognized the human right to water and sanitation, reaffirming that drinking water and sanitation are essential for the realization of all human rights. [3]. Health and water quality are essential for the development and well-being of humans. Providing access to safe water is one of the most effective instruments to promote health and reduce poverty. (WHO, 2017).

In the same way according to statements of [4], Water is essential for life. No living being on Earth can survive without water. Water is essential for human health and well-being as well as for the
preservation of the environment. Despite this, four out of ten people in the world lack access to a simple latrine and almost two out of ten do not have access to a safe source of drinking water. Every year, millions of people, mostly children, die from diseases related to inadequate water supply, sanitation and hygiene.

In accordance with the above [3] it indicates that water is at the epicenter of sustainable development and is essential for socio-economic development, energy and food production, healthy ecosystems and for the very survival of human beings. Similarly [5] expresses that the supply of drinking water constitutes a public service that states must provide in an obligatory manner to individuals, since access to the resource is a collective, basic or fundamental need, said supply has not could be entirely satisfied by many governments in various countries, especially in those underdevelopment conditions prevail [5].

According to figures from the World Health Organization (WHO), it is estimated that 10% of the world population consumes irrigated food with untreated sewage, and that 32% of the world population does not have access to adequate basic sanitation services, generating 280,000 deaths associated with water diseases. It is estimated that 4% of total deaths in the world are related to water quality, hygiene and sanitation. In Latin America and the Caribbean, acute diarrheal diseases (ADD) are one of the ten leading causes of deaths per year (5), due to problems in water quality, mainly due to improper wastewater management [6].

The Political Constitution of Colombia establishes as one of the main purposes of the State's activity, the solution of unsatisfied basic needs, among which is access to the drinking water service, which is fundamental for human life. The adequate supply of quality water for human consumption is necessary to avoid cases of morbidity due to diseases such as cholera and diarrhea [7]. Referring to the importance of water quality in health [5] Most intestinal parasites are transmitted by environmental pollution and in this aspect, water and food play an important role. If the feces are not disposed of properly, the cysts, oocysts and eggs of the intestinal parasites can remain in the home environment or contaminate water sources or crops irrigated with sewage. Therefore, it is estimated that many of the deaths in the world are due to problems related to water, drainage and hygiene.

The framework for which a water sample can be considered adequate or "safe" is a drinking water quality standard. An appropriate standard is, then, the reference that will ensure that water is not harmful to human health. 9 Most of the countries in Latin America, North America, the European Union and other regions and communities have adopted in their quality standards of drinking water, WHO guide values as specific indicators for its national standards [8].

According to the latest data published for the department of Bolívar on waterborne diseases (EVA) and water quality risk index (IRCA) in Colombia 2015. [9] the incidence rate of diseases directly related to the water in Colombia shows that for that last report year 2015, the mortality rate due to acute diarrheal disease (ADD) in children under 5 years of age is 49.5 with very low data in the rate of incidence of hepatitis A "of 0.6 paratyphoid fever incidence rate of 0.5 and incidence rate of leptospirosis of 1.7 showing an average risk IRCA with a 22.13.

This investigation takes into account the provisions of Decree 1575 by [10]. By which the system for the protection and control of water quality for human consumption is established, in which the IRCA is defined as the degree of risk of occurrence of diseases related to non-compliance with the physical, chemical and microbiological characteristics of water for human consumption. In this sense, the present study aims to analyze the results of the Risk Index of Water Quality for Human Consumption in Urban Areas of the Department of Bolivar in order to establish strategies for the prevention of waterborne diseases.

2. Materials and Methods
A descriptive investigation was developed, with the objective of evaluating the compliance of the physical, chemical and microbiological characteristics of water for human consumption according to Resolution 2115 of 2007.
It is very important to express that the data bank used for this investigation on water quality was obtained from the Information System of the Monitoring of the Quality of Water for Human Consumption (SIVICAP), reported to the Government of Bolivar, the data recorded in this base is the result of the report on the monitoring of water quality for human consumption carried out by health authorities in the different territories of Colombia.

This surveillance circumscribes the collection of samples, the analysis and interpretation of results, the provision of information and the use of this information for public health. For the collection of samples, the water quality monitoring plan established in Resolution 2115 of 2007 is developed, and in which the frequency and number of samples are established according to the characteristics and the population supplied. In the analysis the characteristics of color, pH, turbidity, free residual chlorine, total coliforms and Escherichia coli were considered, as they are the most representative indicators of the microbiological and physicochemical quality of the water and mandatory requirement for all 46 municipalities of the country taken for the study. Likewise, the water quality risk index was considered, an instrument established by the regulations to evaluate the quality of drinking water in the country.

It is important to state that in this study the information of the water quality monitoring system for human consumption was taken into account with the Interlaboratory Program for Quality Control of Potable Water (PICCAP), whose objective is to guarantee the reliability of the results of the analysis of water quality governed by the parameters established in Colombian technical standards: NTC-ISO / IEC 17025: 2005 NTC-ISO / IEC 17043: 2010 This program continuously evaluates the analytical quality of the different laboratories in charge of physical analysis, chemical and microbiological water for human consumption.

2.1. Collection of Information
For data collection, the direct observation technique was used, the results of which are based on the application of the standardized measuring instrument authorized by the Ministry of Social Protection in Colombia - IRCA in which the risk score is assigned to each physical, chemical and microbiological characteristic, for estimating compliance with acceptable parameters established in current regulations.

For the interpretation of the results of the inspection of the Water Quality Surveillance for Human Consumption in the Urban Areas of the Department of Bolivar, work was carried out in accordance with the guidelines of Resolution 2115 of June 2007 in which the He developed the application "Information System for the Monitoring of Water Quality for Human Consumption-SIVICAP", which indicates the characteristics, basic instruments and frequencies of the control and surveillance system for the quality of water for human consumption that labels ranges of classification according to the IRCA to assess the level of water risks, therefore the rating ranges are established as follows (see table 1).

The measurement ranges detailed above were applied in the samples taken by municipalities to generate surveillance, inspect and analyze the risk levels of water for human consumption in our Department of Bolívar; Forty-six (46) municipalities taken as a study sample, only 6 of them reached a range of (0 - 5) that is equivalent to NO RISKS, which shows that these waters are suitable for human consumption as the evidenced (table 2), but monitoring should continue. However, it is worth clarifying that this number of municipalities that approved the Water Quality Monitoring Process for Human Consumption is equivalent to 13% of the analyzed sample, the Number of samples chosen, the municipality and the level of risks.
Table 1. Classification of the level of health risk according to the IRCA.

| CLASSIFICATION IRCA (%) | RISK LEVEL               | CONSIDERATIONS                                                                 |
|-------------------------|--------------------------|-------------------------------------------------------------------------------|
| 70.1 – 100              | INVITABLE SANITARIATELY   | Water not suitable for human consumption and requires maximum, special and detailed surveillance. Water not suitable for human consumption and requires maximum, special and detailed surveillance. |
| 35.1 – 70               | HIGH                     | Water not suitable for human consumption and requires special monitoring.        |
| 14.1 – 14               | MEDIUM                   | Water not suitable for human consumption, direct management of the provider.    |
| 5.1 – 14                | LOW                      | Water not suitable for human consumption, susceptible to improvement.           |
| 0 - 5                   | WITHOUT RISKS            | Water suitable for human consumption.                                         |

Continue monitoring

Table 2. Municipalities without Risk Level in the process of Surveillance of Water Quality of the Department of Bolívar.

| MUNICIPALITIES           | Nº. | % IRCA | RISK LEVEL | % CLASSIFICATION | WATER SUITABLE FOR HUMAN CONSUMPTION |
|--------------------------|-----|--------|------------|------------------|--------------------------------------|
| El Carmen De Bolívar     | 4   | 0%     | Without Risks | 0 – 5             | X                                    |
| Montecristo              | 8   | 0.90%  | Without Risks | 0 – 5             | X                                    |
| San Pablo                | 8   | 0%     | Without Risks | 0 – 5             | X                                    |
| Santa Rosa Del Sur       | 12  | 0%     | Without Risks | 0 – 5             | X                                    |
| Simiti                   | 12  | 3.12%  | Without Risks | 0 – 5             | X                                    |
| Turbana                  | 3   | 0%     | Without Risks | 0 – 5             | X                                    |

3. Results and discussions:
The study results were the result of the analysis of 393 water samples reported in 2017, derived from 46 municipalities of the Department of Bolívar.

The characterization was carried out by means of descriptive statistical techniques, considering the dispersion and the normal distribution of the data, and calculating the range between quartiles, taking
as reference in this study the compliance with the norm regarding the potability values by means of the calculation of the percentage of samples that presented results among the maximum values allowed [10] And subsequently, the results of the physicochemical characteristics were analyzed using descriptive statistics techniques, calculating the measurements of position (maximum value, minimum value, first quartile, third quartile and average) and dispersion (standard deviation). The above is detailed in Table 3.

Table 3. Water potability characteristics and values by calculating the percentage of samples

| PARAMETERS               | MAXIMUM VALUES ALLOWED                          |
|--------------------------|-------------------------------------------------|
| Colour                   | 15 units of cobalt platinum                      |
| Turbidity                | 5 nephelometric turbidity units (UNT)            |
| Ph                       | 6.5-9.0; turbidity                              |
| Liquid Residual Chlorine | 0.3 a 2.0 180 Guzmán BL                         |
|                          | 35(Supl.2):177-90 mg/L                          |
| Total Coliforms          | 0 UFC/100 cm3                                    |
| Escherichia Coli         | 0 UFC/100 cm3                                    |
| Colour                   | 15 units of cobalt platinum                      |

For the analysis of the water quality risk index, the average for the total samples per year and by municipality was calculated, the values were descriptively analyzed using historical series, and the municipal geographic distribution and the collection area were considered (rural or urban). The interpretation of the results of the inspection of Water Quality Surveillance for Human Consumption in the urban areas of the Department of Bolívar, was worked according to the guidelines of the regulations in force in Colombia that contains the development of the application "System of Information on the Monitoring of Water Quality for Human Consumption-SIVICAP ", which indicates the characteristics, basic instruments and frequencies of the control and surveillance system for the quality of water for human consumption, having this classification ranges according to the IRCA for evaluate the level of water risks, therefore the rating ranges are established , see table 4.

The measurement ranges detailed above were applied in the samples taken by municipalities to generate surveillance, inspect and analyze the risk levels of water for human consumption of the Department of Bolívar; where of the 46 municipalities taken as a study sample, only 6 of them reached a range of (0 -5) that is equivalent to NO RISKS, which indicates that in the samples taken excellent results were achieved in the characteristics of color, pH, turbidity, free residual chlorine, total coliforms and Escherichia coli, therefore these waters are suitable for human consumption but monitoring should continue. However, it is clear that this number of municipalities that approved the Water Quality Monitoring process for Human Consumption is equivalent to 13% of the analyzed sample, of which the Number of selected samples, the municipality and the level will be detailed below of risks.
Table 4. Classification of the level of health risk according to the IRCA by sample and actions to be taken.

| CLASSIFICATION | IRCA (%) | RISK LEVEL | CONSIDERATIONS |
|----------------|----------|------------|----------------|
| INVITABLE SANITARIATELY | 70.1 - 100 | Water not suitable for human consumption and requires maximum, special and detailed surveillance. |
| TALL | 35.1 - 70 | Water not suitable for human consumption and requires special monitoring. |
| MEDIUM | 14.1 - 14 | Water not suitable for human consumption, direct management of the provider. |
| LOW | 5.1 – 14 | Water not suitable for human consumption, susceptible to improvement. |
| WITHOUT RISKS | 0 - 5 | Water suitable for human consumption. Continue monitoring. |

Table 5. Municipalities without risk in the process of Water Quality Surveillance of the Department of Bolivar, 2017.

| MUNICIPALITIES | N°. SAMPLE | IRCA % | RISK LEVEL | % CLASSIFICATION | WATER SUITABLE FOR |
|----------------|------------|--------|------------|-----------------|-------------------|
| El Carmen De Bolivar | 4 | 0% | Without Risks | 0 - 5 | X |
| Montecristo | 8 | 0.90% | Without Risks | 0 - 5 | X |
| San Pablo | 8 | 0% | Without Risks | 0 - 5 | X |
| Santa Rosa Del Sur | 12 | 0% | Without Risks | 0 - 5 | X |
| Simiti | 12 | 3.12% | Without Risks | 0 - 5 | X |
| Turbana | 3 | 0% | Without Risks | 0 - 5 | X |

The results of the remaining 40 municipalities of the Department of Bolivar, taken as objects of study where the water samples taken for human consumption by SIVICAP, obtained different levels of risks, resulting in of water not suitable for consumption, are analyzed below not suitable for human consumption Human and requires special vigilance. Results were confirmed with a LOW risk level for 6 municipalities with an IRCA between 5.1 - 14, where its description is Water not suitable for human consumption, susceptible to improvement; results with a MEDIUM risk level for 10 municipalities with an IRCA between 14.1 - 14, with a description Water not suitable for human consumption, direct management of the provider; results with a HIGH level of risk for 18 municipalities with an IRCA between 35.1 - 70, with a description Water not suitable for human consumption and requires special monitoring; and it should be noted that 3 municipalities obtained results INVITABLE SANITARIATELY, which means Water not suitable for human consumption and requires a maximum, special and detailed surveillance, where the IRCA obtained is between 70.1 – 100, see table 5.
Table 6. Municipalities with Risk in the process of Water Quality Surveillance of the Department of Bolivar, 2017.

| Municipalities          | N° SAMPLE | IRCA %  | Risk Level | % CLASSIFICATION | WATER NOT SUITABLE FOR HUMAN CONSUMPTION |
|-------------------------|-----------|---------|------------|------------------|------------------------------------------|
| Achí                    | 12        | 45.52%  | High       | 35.1 - 80        | X                                        |
| Altos Del Rosario       | 12        | 10.15%  | Low        | 5.1 - 14         | X                                        |
| Arenal                  | 7         | 45.51%  | High       | 35.1 - 80        | X                                        |
| Arjona                  | 8         | 24.33%  | Mean       | 14.1 - 35        | X                                        |
| Arroyohondo             | 0         | No report|            | -                | -                                        |
| Barranco De Loba        | 12        | 43.17%  | High       | 35.1 - 80        | X                                        |
| Calamar                 | 12        | 49.70%  | High       | 35.1 - 80        | X                                        |
| Cantagallo              | 12        | 34.97%  | Mean       | 14.1 - 35        | X                                        |
| Cicuco                  | 12        | 38.54%  | High       | 35.1 - 80        | X                                        |
| Clemencia               | 9         | 76.55%  | High       | 35.1 - 80        | X                                        |
| Córdoba                 | 7         | 76.78%  | High       | 35.1 - 80        | X                                        |
| El Guamo                | 8         | 28.12%  | Mean       | 14.1 - 35        | X                                        |
| El Peñón                | 8         | 25.23%  | Mean       | 14.1 - 35        | X                                        |
| Hatillo De Loba         | 12        | 86.63%  | I. Sanitary| 80.1 - 100       | X                                        |
| Magangué                | 12        | 16.66%  | Mean       | 14.1 - 35        | X                                        |
| Mahates                 | 10        | 5.11%   | Low        | 5.1 - 14         | X                                        |
| Margarita               | 11        | 68.51%  | High       | 35.1 - 80        | X                                        |
| Marialabaja             | 0         | No report|            | -                | -                                        |
| Mompox                  | 9         | 29.56%  | Mean       | 14.1 - 35        | X                                        |
| Morales                 | 12        | 50%     | High       | 35.1 - 80        | X                                        |
| Norosi                  | 12        | 22%     | Mean       | 14.1 - 35        | X                                        |
| Pinillos                | 12        | 50.12%  | High       | 35.1 - 80        | X                                        |
| Regidor                 | 8         | 51.35%  | High       | 35.1 - 80        | X                                        |
| Rio Viejo               | 8         | 59.62%  | High       | 35.1 - 80        | X                                        |
| San Cristobal           | 12        | 47.04%  | High       | 35.1 - 80        | X                                        |
| San Estanislao          | 4         | 9.40%   | Low        | 5.1 - 14         | X                                        |
| San Fernando            | 7         | 44.64%  | High       | 35.1 - 80        | X                                        |
| San Jacinto             | 0         | No report|            | -                | -                                        |
| San Jacinto Del Cauca   | 12        | 92.44%  | Not Viable | 80.1 - 100       | X                                        |
| San Juan Nepomuceno      | 4         | 85.27%  | Not Viable | 80.1 - 100       | X                                        |
| San Martín De Loba      | 8         | 22.78%  | Mean       | 14.1 - 35        | X                                        |
| Santa Catalina          | 10        | 71.45%  | High       | 35.1 - 80        | X                                        |
| Santa Rosa              | 10        | 51.97%  | Alto       | 35.1 - 80        | X                                        |
| Sopilviento             | 8         | 18.75%  | Mean       | 14.1 - 35        | X                                        |
| Talaigua Nuevo          | 12        | 9.37%   | Low        | 5.1 - 14         | X                                        |
| Tiquisio                | 12        | 75%     | High       | 35.1 - 80        | X                                        |
| Turbaco                 | 8         | 5.13%   | Low        | 5.1 - 14         | X                                        |
| Villamorva              | 6         | 36.62%  | High       | 35.1 - 80        | X                                        |
| Zambrano                | 8         | 9.37%   | Low        | 5.1 - 14         | X                                        |
Therefore, it is consistent to establish that the parameters shown in this study relate the importance of verification by government entities to accurately identify the quality of water for human consumption, based on the basis that it must have ranges of values that are within the parameters established by the WHO and by the applicable legislation in Colombia regarding the water quality standards established by the Ministry of Social Protection and Environment and Housing of Colombia. Regarding the conduct of frequent tests to determine if water contains indicator organisms, it is still the most sensitive and specific way of estimating water quality from the point of view of hygiene. In countries where there is an integrated surveillance system, most outbreaks of water origin have been linked to treatment failures, inclusion of contaminated water in the network or to problems of bacterial regrowth in the distribution system [11].

The most recent data from the [12] confirms that the quality of the air we breathe and the water we drink are the main environmental risk factors that affect the health of the Colombians.

However, [9] Waterborne Diseases (VAS) were classified according to their direct or indirect association with water and their priority for health. Among the directly related and high-priority VAS, there are acute diarrheal diseases (ADD), hepatitis A, cholera, typhoid / paratyphoid fever, Leptospirosis, cryptosporidiosis, giardiasis.

This study presents evidence that shows that the water quality in the municipalities of the Department of Bolivar from the analyzed samples. Finding that there are alarm data such as 18 municipalities in the department of Bolivar with water not suitable for consumption that require space surveillance and even more alarming is to find that 3 municipalities of the department have sanitary non-viable waters that require maximum, special and detailed surveillance see table 6 Among several studies is the one carried out by the water treatment plant in the municipality of El Rosal - Cundinamarca Colombia, showed that 100% of the untreated water and 90% of the treated wastewater were contaminated with microorganisms considering intervention necessary urgent of regulators and manifesting these waters as a potential risk to public health [13]. Other studies such as that of [14] where an analysis was conducted based on the IRCA of drinking water, the result showed that the provider is not complying with the residual Chlorine parameter, when calculating for the risk index. From the quality of water for human consumption, the household tap water samples in both samples showed a medium level of risk, which classifies them as unfit for human consumption; therefore it is essential that the provider carries out corrective actions, since, the breach of a single parameter can lead to the rejection of water intended for human consumption. Another study, such as the one carried out in the urban and rural area of the municipality of Guatavita, Cundinamarca, Colombia, focused like other studies in the country in Resolution 2115 of 2007, analyzed the water for human consumption in the urban area of the municipality of Guatavita. of this the inhabitants of the paths consume the water not suitable for human consumption, since although it is true that in the Bocatomas there is a basic pretreatment that consists of a sand trap and filter, it does not fulfill the appropriate functions, since it allows the water resource reaches homes in non-potable conditions.

This study confirms what was expressed in the research carried out by [15] on water quality indices in surface sources used in the production of water for human consumption; the greatest impact on public health occurs through water supply systems; The alteration of the organoleptic, physical, chemical and microbiological characteristics of the supply source directly affects the level of sanitary risk present in the water. They define as the risk of transporting pollutants that can cause diseases of water origin to man and animals or alter the normal performance of work within the home or industry. [16] They argue that safety is synonymous with impeccability and this is necessary in terms of
nutritional quality, since the only guarantee to prevent diseases is the protection, conservation, cleaning, disinfection and other operations committed to the preparation process, it is done respecting the parameters quality.

Being consistent with the above, the results of this study allow to express that for the low, medium and high levels it is essential that direct intervention by the state through the authorized entities in Colombia and in turn in each Department to control and ensure the water quality for human consumption, as well as the level that shows unfeasible sanitary, the concentration of the state and the community is important for the prevention of waterborne diseases as a public health problem which requires special, maximum and detailed attention, water quality being even a determinant of poverty in a community. Being the optimum water quality critical aspect of development and social welfare and is the starting point to educate poverty. WHO asserts that WHO estimates that 94% of diarrhea cases could be avoided through environmental modifications, for example, through interventions that increase the availability of clean water and improve sanitation and hygiene.

This study considers that if the prevention of waterborne diseases is taken as a strategy and sensitize the inhabitants of the municipalities, they will act with a preventive culture, even if the correct procedure is that there is drinking water from the state entities suitable for human consumption with the physical, chemical, microbiological and organoleptic characteristics of a quality water accompanied by an optimal service that comes directly from the taps of homes with the required temperature and pressure and does not need to be stored as currently occurs in some places. Conduct disease promotion and prevention campaigns where they can guarantee the population the acquisition of a storage tank that meets the conditions to guarantee the non-contamination of the liquid.

![Figure 1. Own elaboration.](image)

The present study has limitations. The most important is due to the characterization and costs of water-borne diseases, as well as the occurrences of water-associated diseases in the municipalities where the samples that present high-level risks in sanitary areas are not taken. However, it was possible to establish the Risk Index of Water Quality for Human Consumption, so that it serves as the
basis of other studies that involve the quality of water for human consumption in Urban Areas of the Department of Bolívar.

4. Conclusions

Finally, after analyzing the results on the Risk Index of Water Quality for Human Consumption in Urban Areas of the Department of Bolívar, it must be concluded that even when there is no evidence of contamination or physical, chemical and microbiological alterations in all of the 46 Municipalities studied that greatly alter the quality and logically the potability of water, it is alarming that only 6 of them produce results "without risks", taking for granted that their characteristics for human consumption are suitable; However, the most worrying alarm is to find a large number of municipalities with water not suitable for human consumption and much more impressive still, is that there are some, although a minority, that are not sanitary.

As a consequence of the above, In view of the evidence collected and despite the worldwide concern by the WHO, and all the nations of the world for having quality water, both in developed and developing countries, the importance is stressed that the healthiness of water has for the health of populations and how this is the fundamental pillar for the proper functioning of a nation, as an important part of the axes that determine government development plans in which water is always as a point heading for the basic sanitation of the municipalities and cities. The importance of having water for society is such that every day the sick population grows due to not having this liquid, with the established quality indices based on IRCA. This study leads us to see clearly the reality of water quality in the municipalities of the department of Bolívar in Colombia, concluding this opens a great space and opportunity for improvement and that the results of this study can be the input and the tool for the adequate decision-making related to the design of robust public policies aimed at the prevention of diseases caused by water, which is ultimately the great problem when there are populations in which water does not meet the criteria and whose results will always go target a significant number of women, men and children who are constantly getting sick from the use and consumption of water under unsanitary conditions.

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