Safe water and sanitation for a healthy life

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CAF DEVELOPMENT BANK OF LATIN AMERICA AND THE CARIBBEAN

Safe water and sanitation for a healthy life

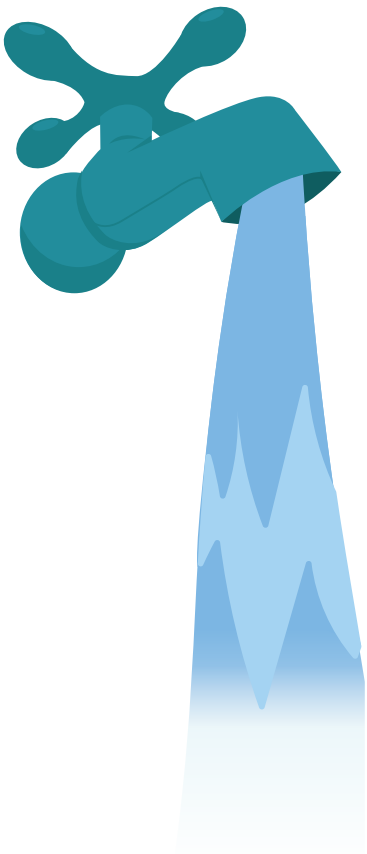
ImpactoCAF is an initiative created by the Department of Development Contributions and Impact Evaluation, under the Planning and Development Impact Division of CAF. The elaboration of this document was carried out by Lesbia Maris.

Guillermo Alves, Agustina Hatrick, Matías Italia, Daniel Ortega, Cecilia Paniagua, and Franz Rojas provided valuable comments and suggestions to the document.

Additionally, this document benefited from the contributions of Agustín Alonso, Matías Italia, and Carlos Volcán.

Graphic design: Estudio Demaro / La Plata, Buenos Aires, Argentina

Editorial review: Rosario Inés De Rosa



Safe water and sanitation for a healthy life

Water is an indispensable resource for life. The human body needs it for optimal physical and cognitive functions.[1] In daily life, it is fundamental for carrying out all kinds of domestic activities, from washing food and personal hygiene to the upkeep of living spaces. Sanitation, although typically considered as a secondary service, is a crucial complement to water services. Adequate sanitation prevents sewage from coming into contact with food, drinking water, or living spaces, limiting people's exposure to substances that are harmful to health.

Poor water quality or inadequate sanitation compromises the livelihoods and opportunities of millions of people around the world. This is why it is essential, first, to expand and improve infrastructure for access to safe drinking water and wastewater treatment, and second, to promote the correct use of sanitation facilities and good hygiene practices in communities.

CAF's actions since 2010 to address water and sanitation issues:

113 projects
that have improved access
to quality water and sanitation

+20 million
Latin Americans and Caribbeans benefited

13 countries
in the region supported

In addition, it has promoted the safe and integrated management of resources by public and private stakeholders to achieve greater wellbeing while ensuring the sustainability of ecosystems.[2]

Challenges to water and sanitation access and CAF's actions

Challenges

Access to water and sanitation services has improved significantly in Latin America and the Caribbean over the last 20 years. Since the Millennium Development Goals were adopted in 2000, three-quarters of the population has gained access to safely managed water services; people using unimproved water sources has decreased by 80%; and the number of people with access to safely managed sanitation services has doubled.[3]

However, despite this marked improvement, significant challenges remain to ensure that the entire population has full access to quality water and sanitation services.[4] The Sustainable Development Goals (SDGs)—set in 2015—stipulate that 100% of the population should have access to safely managed water and sanitation services by 2030. Today, 17 million Latin Americans and Caribbeans (3% of the population) have limited access to water or consume it from unsafe sources. Likewise, 430 million people (66% of the population) do not have access to a sanitation solution that properly separates, transports, disposes of and/or treats excreta. Residents of rural areas and informal urban settlements face the greatest vulnerability, especially women and children.

Significant challenges remain to ensure that the entire population has full access to quality water and sanitation services.

IN LATIN AMERICA AND THE CARIBBEAN:

17 million (3%)
have limited access to water or consume it from unsafe sources

430 million (66%)
do not have access to a safe sanitation solution

Three times the current investment—which is around 0.16% of annual GDP[5]—is needed to close the access gap to these services, according to estimates. This investment varies greatly by and within countries. The specific needs and characteristics of areas with limited access or poor-quality water and sanitation services must be taken into account in choosing the ideal water and sanitation system to implement, and therefore in determining the cost of providing a solution to the problem.

Moreover, in rural areas, supplying quality water and sanitation services entails different challenges than in urban areas, related in part to the existence of fixed costs, economies of scale, and externalities.

CAF's main actions

To address these challenges, CAF has financed:

USD 4.17 billion
over the past ten years in water and sanitation operations

↳ **11% of CAF's approvals**
to the public sector during this period

USD 3.3 billion
mobilized in co-financing and/or counterpart financing

Water operations have included:

- components to ensure greater service continuity,
- more treatment and pumping capacity, and
- increased coverage through the expansion of the pipeline network.

In sanitation, most of the operations have included:

- increased coverage in service
- increased wastewater collection capacity
- increased sewage treatment capacity

In rural areas, CAF has financed a large part of MiAgua—program for increased investment in water—in Bolivia, through which **400,000 rural families have gained access for the first time to a safe water source** directly in their homes or very close to them.

In addition, CAF has supported:

- Management capacities through the inclusion of institutional strengthening components in some credit operations
- Action and training plans for officials working in areas related to the management of water and sanitation services

- **Project structuring through design and feasibility studies, bidding processes, and quality supervision**
- **The generation and dissemination of knowledge through the publication of guides and case studies related to drinking water systems, water resource management, ecosystems, and water governance, among other topics.**
- **Training, or the creation of training platforms to improve governance and encourage financing for water and sanitation projects.**

Why promote access to water and sanitation services?

Access to adequate water and sanitation services and practicing good hygiene improve not only health indicators but also poverty, hunger, and inequalities metrics.

Child health and nutrition

In the region, for every 1,000 live births, 16.2 children die before their fifth birthday. This figure is slightly more than double the average for OECD countries (6.8).[a] Diarrhea is the second leading cause of infant mortality, with a rate of 0.64 deaths per 1,000 live births per year.[b6]

Moreover, diarrhea leaves sequelae in children that are very difficult to reverse. Systematic recurrence of diarrhea can lead to intestinal parasitic infections or enteric environmental dysfunctions which, in turn, have been linked to stunting (chronic undernutrition).[7]

Chronic or recurrent undernutrition—low height-for-age— causes children's bodies to stop absorbing nutrients adequately or divert them directly to attack infections.[8] It also impedes physical development and affects

a (WHO, accessed on July 7, 2022).

b Information calculated using data taken from WHO data, consulted on January 17, 2023. The causes of infant mortality considered do not include those related to congenital anomalies, birth trauma or asphyxia, accidents or other infectious complications at birth.

the immune system structurally. Above all, it negatively affects children's brain development and compromises their ability to learn and subsequently use knowledge productively.[9] This, in addition to increasing private and public health expenditures, represents an enormous emotional burden for families and a hindrance to the ability of the countries of the region to generate wealth and improve wellbeing.

Existing evidence shows that access to improved water and sanitation services helps reduce diarrhea, including its duration and severity,[10] especially in rural and disadvantaged areas.[11]

This impact is especially important among children under the age of five. In this age group, access to water and sanitation reduces the incidence of diarrhea by half.[12c] Although the most effective way to reduce the risk of this disease is to provide treated water directly to the household through pipes, alternative treatment solutions also have considerable positive impacts. For example, point-of-use chlorination treatment reduces incidence in children by 1%–25%, and solar treatment solutions, by 13%–33%.

Similarly, in rural areas with dispersed populations, the supply of piped treated water is logistically and financially difficult. Access solutions often consist of bringing improved water sources closer to the household premises. These solutions also have positive effects, although smaller than those generated by solutions that improve quality (reduction in the risk of diarrhea of up to 20%).

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c This evidence, for low- and middle-income countries, has been rated as moderate quality.

In the last five years, **CAF has contributed to the construction of**[d]**:**

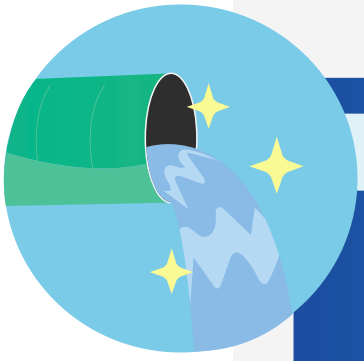
+1,300 km
of drinking water pipes and nearly **100,000** new household connections

17
drinking water plants

+1,700 km
of sewer pipes and around **80,000** new household connections

34
wastewater treatment plants

12 million
people benefited throughout the region



MIAGUA PROGRAM IN BOLIVIA

292,000
new household connections

8,200
community pools

400,000
people benefited

who have improved
hygiene practices [13]

d Number of beneficiaries estimated based on the capacity foreseen in the designs of the water and sanitation solutions.

The risk of children contracting diarrhea is reduced by about 40% with interventions that connect households directly to a sewer network, such as those financed by CAF.

In the case of sanitation, the risk of children contracting diarrhea is reduced by about 40% with interventions that connect households directly to a sewer network, such as those financed by CAF in 18 of the 19 sanitation operations over the past five years. The reduction in incidence with interventions that provide basic sanitatione is around 21%,[14] although again the effectiveness varies greatly depending on the specific type of solution households receive.[15] It is also worth highlighting that the higher the proportion of households covered by the sanitation solution within the same community, the greater its effectiveness.[16] This is because the benefit to a given household is greater when its neighbors also have access to sanitation. Moreover, improved sanitation reduces contamination of the subsoil[17] and water bodies.[18]

CAF's water and sanitation interventions over the past five years have contributed to reduce:

- **by about half the number of diarrhea episodes in the beneficiary sites, lowering the number of annual episodes per average child from 2.78 to 1.38. This is equivalent to a drop from 2.8 million episodes in a year to 1.4 million.[f]**
- **deaths of children under 5 years of age due to diarrhea, which improves inequality, since the incidence of the disease is much higher in more disadvantaged populations.[19]**

50% less

› diarrhea episodes

› deaths of children under 5 years of age due to diarrhea

This is equivalent to a drop from 2.8 million episodes in a year to **1.4 million**

e Basic sanitation is the use of improved spaces that are not shared with other households [JPM (2022)].

f This calculation was based on: (1) the number of beneficiaries expected at the start of the projects financed; (2) the average percentage of the region's total population aged 0 to 5 years (CEPALSTAT data for 2020); and (3) the number of diarrhea episodes per child in that age group in the region estimated for 2016 (GBD 2016 Diarrhoeal Disease Collaborators). The average reduction was assumed to be that corresponding to that of accessing the best possible service: treated water and safe sanitation directly in the home, based on Wolf et al. (2022).

As safe water and sanitation solutions reduce the cases of diarrhea, children's nutritional status should also improve.

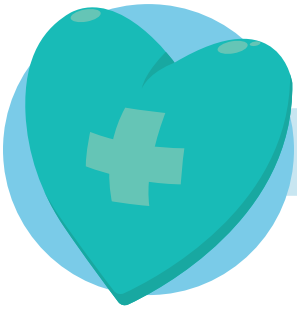
As safe water and sanitation solutions reduce the cases of diarrhea, children's nutritional status should also improve. This is precisely what studies tracking height-for-age (chronic undernutrition) in children under 2 years of age[20g] have found. The positive impacts can be even greater when water, sanitation, and hygiene interventions are combined, or when they are complemented by nutrition programs.

Access to water and sanitation also reduces the incidence of respiratory diseases in children by up to 30%. This is highly relevant given that acute respiratory infections, such as pneumonia, are the leading cause of hospitalization and death in children under age 5, especially in middle- and low-income countries.[21]

Similarly, there are diseases, both in children and adults, caused by prolonged contact with certain polluting chemicals, such as arsenic or copper, present in water sources contaminated by natural causes, industrial or agricultural activity, or by the absence of adequate sanitation.[22]

All of the above implies that clean water and sanitation solutions could lead to healthier children with age-appropriate growth, better able to attend school and increase their productivity, who can become citizens who contribute to the generation of wealth in the near future.[23]

g It is possible that the decrease in the risk of diarrhea in children is due to the fact that the interventions help to reduce the probability of contracting certain viruses and not so much to the fact that they reduce the prevalence of bacteria and parasites that are the main causes of malnutrition [Grembi et al. (2020)].



Adult health and productivity

Diarrhea is not a problem that only affects children. In Latin America and the Caribbean, by 2016, deficits in access to water, sanitation and hygiene were directly related to about 40% of all diarrhea deaths and other conditions such as respiratory conditions, malnutrition, schistosomiasis, malaria, trachoma, and geohelminth infection.[24]

In addition to the direct costs of health care, there are other costs related to the time devoted attend to one's own or family members' illnesses: lost work days or lower productivity.[25] Thanks to more convenient access to water and sanitation, families also save time and resources spent on collection[26], and water-related conflicts are reduced.[27]

Dedicating economic, mental, and logistical resources to solve access problems also limits the attention and time dedicated to other activities, such as working or studying.[28] All of the above, combined with the dissatisfaction of living in unhealthy conditions and danger to physical integrity, leads to situations of stress and anxiety that affect people's quality of life.[29]

Quality of health care

Water and sanitation also play a crucial role in the provision of health services, since good quality primary care requires, among other things, spotless and aseptic spaces, and medical personnel who comply with minimum hygiene conditions. If these conditions are not met, patients going to health centers may receive care but could also be exposed to life-threatening infections.

Globally, 26% of neonatal deaths and 11% of maternal mortality are associated with lack of cleanliness in healthcare settings.[30]

Pollution and environmental conservation

Regarding the environment, attention must be paid to the sustainability of water resources and the pollution caused by inadequate sanitation. The sustainability of water resources depends to a large extent on good management of the available sources. Indiscriminate or careless use of water resources—without adequate coordination mechanisms among users—generates risks of resource depletion.

The disposal of human or industrial waste in unsuitable places causes problems of contamination and degradation of ecosystems, which affects not only water sources, but also other activities that depend on the exploitation of natural resources, such as agriculture, fishing, and tourism.[31]

Emblematic case: the Panama City and Panama Bay Sanitation Project

- CAF granted Panama City **US$185 million** in financing
- Objective: improve the environmental quality of the bay by increasing wastewater collection and treatment capacity.

Water and sanitation for sustainable development

- Inadequate access to water and sanitation services—in terms of quantity and quality—represents an economic cost of about 1.5% of GDP for the countries of the region.[h]

- Guaranteeing access is not only an important aspiration in and of itself but is also a fundamental pillar for sustainable development, which includes:

- The benefit of achieving universal coverage of basic water or sanitation services far outweighs the investment needed to close the gaps. The benefits can be three to four times greater than the cost. For the poorest rural communities in Latin America and the Caribbean, this ratio can be as high as 10 and 8 times greater for water and sanitation, respectively.[32]

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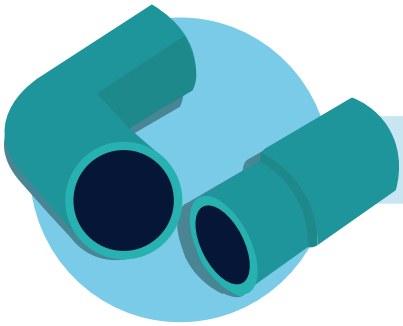
h Economic impact reports on the lack of water and sanitation for four countries in Latin America and the Caribbean (CAF, 2017). These reports quantify the cost of doing nothing about the current situation of access to water and sanitation in Bolivia, Panama, Paraguay, and Peru. They include costs associated with health (health care, time lost due to illness, productivity losses, and income lost due to death), resources allocated to the purchase of drinking water or water purification, use of time, and the impact on some economic activities such as fishing and tourism.

One step further: new and better practices

It is clear that water and sanitation projects benefit households and society as a whole in multiple dimensions. However, their potential impact depends on some factors that go beyond the provision of infrastructure, and these factors are being increasingly included in the design of interventions.



Effective use of infrastructure

The benefits of water and sanitation projects depends on the levels of adoption and adherence to the new infrastructure,[33] i.e., households' effective use of the infrastructure.

Effective use of infrastructure may be lower than initially expected if households must incur monetary or time costs to connect to the new systems. In rural settings, effective use of improved water sources may be as low as 75%, according to some studies in Latin America and Africa.[34] In sanitation, the effective use of new networks may be only one-third of potential connections in Latin America.[35] Although in most cases, the most common barrier that prevents households from connecting to public networks is financial, public policy should also address existing informational, behavioral, and logistical barriers.

Adoption of hygiene practices

Hygiene practices are another key ingredient in ensuring the positive impact of water and sanitation interventions.[36] Changing household hygiene practices, however, is not so easy[37] . In low- and middle-income countries, less than 25% of the population wash their hands after using the toilet.

- CAF has financed some programs in the region to complement water and sanitation interventions in order to ensure good hygiene practices.
- An example is the **Creciendo con Agua Segura [Growing with Safe Water] program.**
- This program was piloted in 2022 in rural areas of Bolivia served by the MiAgua program
- Objective: disseminate hygiene practices with a community focus: the home, educational and childcare centers, and health centers. The program was designed so that the best practices are promoted and followed up by the community itself.

The adoption of new practices or the use of new services requires behavioral changes that are not easy to implement, especially in the short term[38] and in the case of preventive actions.[39] Household knowledge, preferences, and financial and logistical constraints play a very important role. If the household is unaware of the existence of the service or its benefits, it will be less likely to use it or adopt the recommended hygiene practices.[40] The same may occur if household members consider that the use of the new infrastructure or behavior change is simply not convenient or is less convenient than other alternatives (in time, physical effort, and monetary resources).[41]

Therefore, some water and sanitation interventions have been complemented with training and/or awareness-raising activities at the household or community level, which, according to the evidence, could be effective in the short term.[42]

In programs aimed at rural areas, such as the aforementioned MiAgua program or the Agua para Comunidades Rurales [Water for Rural Communities] program in Argentina, resources were included to raise community awareness about the importance of sanitation and proper water use and to train them in the management of services.

It is worth mentioning, however, that several studies have found that the behavioral changes generated by training actions are difficult to sustain in the long term.

Infrastructure sustainability

The post-investment period starts when water and sanitation infrastructure projects are completed. In this period, the continuity of new water and sanitation services must be planned and implemented. Inadequate or insufficient maintenance affects the quality and quantity of water that families receive, leaving them more vulnerable to disease.[43]

This problem is especially acute in rural areas, due to the small scale of the services and the lack of capacity. Community participation can be key to ensuring the sustainability of services, although it has been found that without some external support, the community tends to neglect maintenance[44] in the medium and long term.

This can be achieved by involving the population in the pre-investment stage to ensure that the solution offered is in line with their preferences and needs. Ideally, the community should also receive external technical support regularly to maintain commitment and ensure proper maintenance of the infrastructure.

To address these needs—capitalizing on the lessons learned in multiple water projects in recent years—CAF has progressively included different types of components in its projects:

- » activities to increase community participation in all project phases in rural areas
- » actions for the creation of community support mechanisms once the infrastructure works are completed
- » strategies to develop better service management capacities in the supplier institutions

- In the case of MiAgua [More investment in Water] program, the progressive incorporation of pre- and post-investment components has been key to achieving positive impacts on the populations involved[45]

- In 2019, an initiative was carried out in Paraguay to provide water treatment supplies to rural families and support the creation of community commissions for water management[46]

- Since 2018, under the **Programa de Preinversión para el Sector Agua (PPSA) [the Water Sector Pre-Investment Program]** CAF has financed pre-investment studies that seek to improve the sustainability of water and sanitation projects through better designs and planning and supervision processes.

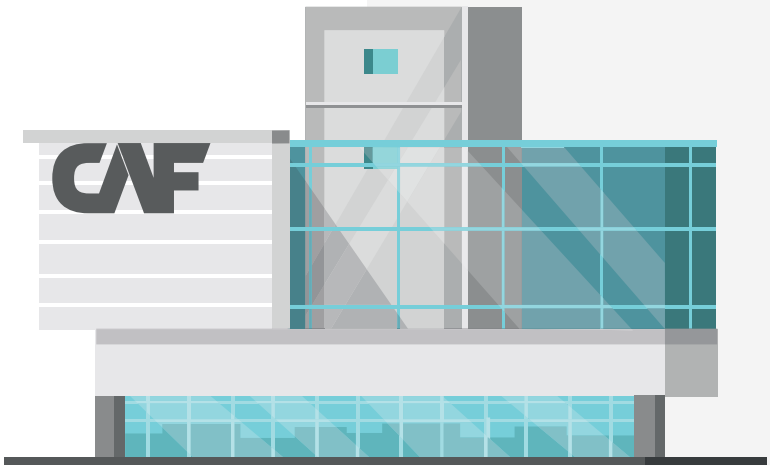
Under the PPSA, CAF has approved:

USD 20 million

25
technical cooperation projects

9
countries in Latin America and the Caribbean benefited

- Also, since 2018, CAF has offered a massive open online course for people interested in the sustainability of rural water and sanitation services.



In summary

Access to safe water and sanitation services are essential for building more prosperous societies, as they play a key role in individual health, social wellbeing, and environmental sustainability.

Children are the main beneficiaries of safe access to water and sanitation, as they can grow healthier and appropriately, thus being able to enjoy a more enriching and happier childhood.

Families, in general, also benefit as all members are healthier and have more time and energy to devote to wellbeing and income-generating activities.

Countries whose populations do not have access to sufficient quantity or quality of water face greater difficulties in achieving prosperity, development, and equality.

CAF, in partnership with other stakeholders, took on the challenge of reducing the gaps in access to drinking water and sanitation services in Latin America and the Caribbean.

Its financing, advisory services and training actions have reached diverse communities and have enabled progress toward universal and equitable access to drinking water, improved sanitation services, and hygiene practices that guarantee better health and a better life for all.

Reference notes

1 European Commission (2022)

2 CAF (2021)

3 JMP (2022)

4 Gómez Vidal et al. (2021)

5 CAF (2022)

6 Ugboko et al. (2020)

7 WHO (2019)

8 Gizaw and Worku (2019)

9 Pizzol et al. (2021)

10 Wolf et al. (2022), Andres et al. (2018) and Galiani et al. (2009)

11 Gamper-Rabindran et al. (2008)

12 Wolf et al. (2022)

13 CAF (2020)

14 Waddington et al. (2009), Wolf et al. (2022) and Wolf et al. (2018)

15 Contreras and Eisenberg (2019)

16 Wolf et al. (2018)

17 Mukherjee et al. (2019)

18 Yindong et al. (2017)

19 Bhalotra et al. (2021)

20 Bekele et al. (2020) and Gizaw and Worku (2019)

21 Ashraf et al. (2020)

22 Hutton and Chase (2016)

23 Andres et al. (2018))

24 Prüss-Ustün et al. (2019)

25 Hutton (2015)

26 Ruber and Zintl(2011), Devoto et al. (2012), Ashraf et al. (2017), Celhay et al. (2021) and Galiani et al. (2009)

27 Devoto et al. (2012)

28 Mani et al. (2013)

29 Sclar et al. (2018)

30 WHO (2019)

31 Hutton and Chase (2016) and Hyun et al. (2019)

32 Hutton (2015)

33 Bekele et al. (2020), Ruber and Zintl (2011), Waddington et al. (2009), Andres et al. (2018) and Gómez Vidal et al. (2021)

34 Ruber and Zintl (2011) and Celhay et al. (2021)

35 Sturzenegger et al. (2020)

36 Cairncross et al. (2010), Dey et al. (2019) and Wolf et al. (2018)

37 Celhay et al. (2021), Waddington et al. (2009), Andres et al. (2018)

38 Bekele et al. (2020) and Null et al. (2018)

39 Dupas and Miguel (2017)

40 Gómez Vidal et al. (2021)

41 Waddington et al. (2009), Ruber and Zintl (2011), Nielsen et al. (2022) and Null et al. (2018)

42 Dey et al. (2019), CDC Report (2006), Freeman et al. (2014)

43 Ashraf et al. (2017) and Bhalotra et al. (2021)

44 CDC report (2006) and Celhay et al. (2021)

45 CAF (2020)

46 CAF Sustainability Report (2019)