

Case Study: **Nepal**

#15 | July 2022

## ENSURING WATER QUALITY THROUGH THE REGULAR USE OF CHLORINE AND FRC TESTING IN KANCHANPUR, NEPAL



### ■ Background

Nepal has relatively high inland water resources and is geographically diverse. It is topographically divided into three regions: high Himalaya, middle Hill, and low land Terai. Due to such diversity, the drinking water services are different in all regions. In Himalayas and Hilly regions, water supply systems are mainly through gravity flow whereas hand-pumps and deep boring are in Terai. As per the Department of Water Supply and Sewerage (DWSSM) 2019, there is 51.69% access to basic drinking water through 42,039 piped systems and 33.39%<sup>1</sup> through shallow tube well / deep borings. Although the National Multiple Indicator Cluster Survey report, 2019 shows that access to the basic water supply<sup>2</sup> is 95.4%, only 19.1% of households have safely managed<sup>3</sup> drinking water supply. There is high access to basic water supply among the population, however the safely managed water supply seems very low due to the limited focus on water quality aspects.

Nepal Government's primary priority has been to increase access on basic water supply whereas focus on water quality aspects is secondary. The MICS report, 2019 shows that the drinking water quality at source

<sup>1</sup> Water supply and sanitation status report, 2019 (DWSSM)

<sup>2</sup> Basic services: drinking water from an improved source, provided collection time is not more than 30 minutes in a round trip.

<sup>3</sup> Safely managed: an improved drinking water source located on premises, free of E. coli and available when needed.

and households is highly contaminated with *E. coli*<sup>4</sup> which is 75.3% and 85.1% respectively. There are different options available for water treatment such as coagulation, flocculation, sedimentation, filtration, and disinfection. Chlorination (disinfection) is one of the easiest and most widely used methods for water treatment but its efficacy can be influenced by the procedures, range of free residual chlorine, time duration, and distribution system. Therefore, Free Residual Chlorine (FRC)<sup>5</sup> with a range of 0.1-0.5 mg/l<sup>6</sup> should be maintained in each point to assure the access of safe drinking water to the community from the source.

The “Adarsha Water Supply system” is one of the deep boring overhead water supply systems in Bhimdatta Municipality-3, Kanchanpur of Sudurpaschim Province, Nepal. Most of the water supply systems in Terai are from deep boring with overhead water tanks. As per the DWSSM, 416 piped systems cover around 90% of the total basic water supply<sup>7</sup>. The total capacity of the overhead tank of this system is 4 hundred 50 thousand cubic meters, which was constructed in 2011 and handed over to consumer groups in 2015. This water supply system is designed for 2500 households and to date served 2325 households whereas 10 full-time staff are working to regularize the systems and operational functions. This system has inbuilt regular chlorination at central through an auto-dosing system. However, as this system has long pipelines, the residual chlorine concentration decreases with the distance of distribution. The FRC testing in a different point of use is required but is not in practice. It is unknown whether the water served to all the beneficiaries is safe or not in terms of *E. coli*. Thus, the installation of sub-station for chlorine dosing units at the network and regular FRC testing services at different levels can scale up safe drinking water for the community.

### ■ Strategy and Implementation

The Sustainable Development Goal (SDG) 6.1 include a target for universal and equitable access to safe and affordable drinking water for all by 2030, which might be difficult for least developed countries to achieve. Nepal government has also committed to fulfilling the set target by SDG Goal 6.1 by 2030. The constitution of Nepal has embedded access to water supply and sanitation as a fundamental right of a citizen through provisions made in Article 35(4). The appendices of the constitution have defined the provision of water supply and sanitation as a matter of concurrent function between the national, provincial, and local level governments. Thus, there should be a strategic intervention at the local level to realize and ensure the results of SDGs as well.

UNICEF Nepalgunj Field Office has been supporting the Nepal Government to scale up Water Safety Plan (WSP) and Water Safe Community (WSC) in urban and semi-urban areas in Karnali and Sudurpaschim province. The project was posted on the UN portal on 11th April 2022 and was started in May 2022 and will go up to eight months. The following activities are systematically applied:

---

4 *E. coli*: *Escherichia coli* is a bacterium that is commonly found in the gut of human and warm-blooded animals and its presence indicates the presence of other harmful pathogens.

5 Free Residual Chlorine (FRC): a test used to check the amount of free residual chlorine present in the water sample.

6 According to National Drinking Water Quality Standards of Nepal (NDWQS) 2005

7 Water supply and sanitation status report, 2019 (DWSSM)

1. **Coordination & communication:** Due to the cross-sectoral nature of the project, the technical partner needs to build strong coordination with the local governments and WASH stakeholders in respective areas of implementation.
2. **Community engagement:** An agreement has been made between UNICEF Nepal and the municipality on 26th April 2022. Community engagement at the household level is the top prioritized task for the sustainability of the project. Activities related to capacity building of municipalities and communities on water quality testing and monitoring to increase access to safe water supply in the selected communities will be performed.
3. **Reconstruction of pipes:** Installation of the sub-station chlorine dosing units is the main intervention of the project. This process makes sure the availability of chlorine in the water. Thus, each household in the community can access safe drinking water.
4. **Support to use of FRC tests:** UNICEF can provide technical training on water quality treatment and monitoring, financial support, and advocacy for the development of a long-term WASH Plan at the Local Government level (Palika).

### ■ Progress and results

The assigned project was initiated in May 2022 and the progress will be made by the end of December 2022. The main goal of the project is to support selected Rural Municipalities and Municipalities of Sudurpaschim and Karnali Provinces in the implementation of WSP leading to the declaration of WSC.

1. **Coordination & communication:** UNICEF Nepalgunj Field Office is carrying out the overall management of the partnership for this assignment with technical backstopping from Civil Society Organizations (CSOs).
2. **Community engagement:** Currently, UNICEF Nepal and Bhimdutta municipality is collaborating with the National Environment and Equity Development Society (NEEDS) Nepal, which engages with the community in the field.
3. **Reconstruction of pipes:** Till the end of April 2022, pipelines are distributed up to 76 KM at the Bhimdutta municipality. The sub-dosing system installation and reconstruction are initiated.
4. **Support to use FRC tests:** The estimated date of the start of the project is 1<sup>st</sup> May 2022. The evaluation criteria associated is split between technical and financial as weightage for technical proposal (70 %) and weightage for financial proposal (30 %).

The expected result at the end of the interventions is to declare at least 6 WSPs targeting the WSC in urban and semi-urban areas in Karnali and Sudurpaschim Provinces with proper water quality testing and monitoring mechanism. This intervention in the water supply system will decrease the risk of water-borne diseases such as diarrhoea, dysentery, typhoid, and other similar diseases in children and families which is caused due to fecal contamination in drinking water.

### ■ Lessons learned and way forward

As this is an ongoing project, further lesson learned are yet to be documented. However, some of the expected lessons learnt based on current development are:

1. For the success of the project, all three levels of Government (Federal, Provincial and Local), Non-Government Organizations (NGOs), private sectors and developing partners need to work in close coordination with each other. If worked together with common belief, coordination, and joint effort the targeted goals can be achieved on time.
2. There should be ownership among the community for the project to be sustainable after its completion of the project. Active participation of the community is essential for the sustainability

approach. Thus, the communities should be trained for their capacity enhancement to access and test FRC on their own for the sustainability of the intervention.

As for now, the way forward is to fully implement the programme in support and coordination with UNICEF, local government and municipality. It is a research-based project, initiated by UNICEF Nepalgunj and once completed, depending upon the success of the intervention, the result, idea and intervention will be applied to other water supply systems. As the water source of Hilly region of the Karnali and Sudurpaschim Provinces is highly contaminated with E. coli, thus, these regions of Nepal could be further benefitted from this programme.

---

Related links:

- [Department of Water Supply & Sewerage Management \(DWSSM\), Government of Nepal, 2019](#)
- [Multiple Indicator Cluster Survey 2019 \(unicef.org\)](#)
- [Water Treatment | Public Water Systems | Drinking Water | Healthy Water | CDC](#)

## UNICEF

Author: Pratibha Chaudhary; Email: [prchaudhary@unicef.org](mailto:prchaudhary@unicef.org)

**For more information, contact:**

Bishow Raj Bhatt; Email: [brbhatt@unicef.org](mailto:brbhatt@unicef.org)

Katak Bahadur Rokaya; Email: [kbrokaya@unicef.org](mailto:kbrokaya@unicef.org)

The statements in this publication are the views of the authors and do not necessarily reflect the policies or the views of UNICEF.