A NOVEL WATER TREATMENT SYSTEM IN A LOW-RESOURCE COMMUNITY

Fig, 1 Villagers collecting water at the standpost

Fig. 2 Map of the implementation of the Project, Benin

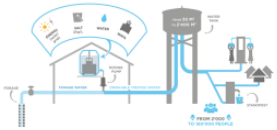
INTRODUCTION: This study evaluates the performance of a novel low-cost technology in rural Benin (West Africa) that locally produces chlorine (sodium hypochlorite) then injects it into the local water system.

METHODS: 31 Water tanks were selected in cooperation with local authorities to receive a novel technology using electro-chlorinator devices (WATA™) adapted to field conditions that produces liquid chlorine to be coupled into the dosing pump tank. After the implementation of the novel technology in the local water system, we administered a satisfaction survey as well as an analysis for fecal bacteria. Water samples were collected at three points: before chlorination, at the faucet nearest the point of chlorination, and finally at the most distant terminal after chlorination. To evaluate the water quality, residual chlorine control tests were performed using WataBlue™ reagent and Self-test was used for microbiology control.

Fig. 5: Operator at the chloration production

RESULTS: The 31 water tanks were distributed in 19 villages located in seven different departments. It is estimated that over 130,000 people use these facilities regularly. The water provided was not always chlorinated and 16 out of 31 tanks had a lack of access to chlorine powder. This was one of the biggest challenges in disinfecting water.

Our research shows that traditionally this is mainly because of logistics (81%) but also cost issues (29%). Amongst the sites using the novel technology, 30% (9/31) of them had technical infrastructural problems like lack of water (1), faulty dosing pump (7), and lack of electricity (1) that prevented the system installed to perform.



Fig, 3: Scheme of the water treatment and distribution

Fig. 4: Visual representation of the water network

Furthermore, 60% of the water samples collected before chlorination were positive for microbiological contamination. After the installation of the WATA™ technology, all samples collected from functioning systems were negative for microbiological contamination.

However, the water from six tanks presenting infrastructural problems continued to be distributed to the population despite testing positive for microbiological contamination. The average residual chlorine level analyzed at the most distant terminal fountain was 0.29 ± 0.2 mg/L which is within the country's reference level 0,1-0,8 mg/L.

CONCLUSION: In the sites that we studied in remote communities of Benin, the major challenges to water treatment were 1) the cost and logistics of acquiring chlorine tablets and 2) infrastructure problems.

The installation of water-chlorinator devices (WATA™) to produce chlorine locally to be dispensed into the system can effectively eliminate many of the traditional setbacks and produces water without microbiological contamination and with chlorine levels within the WHO's recommended values. However, the success of the technology tested depends on the infrastructure of the water facility.