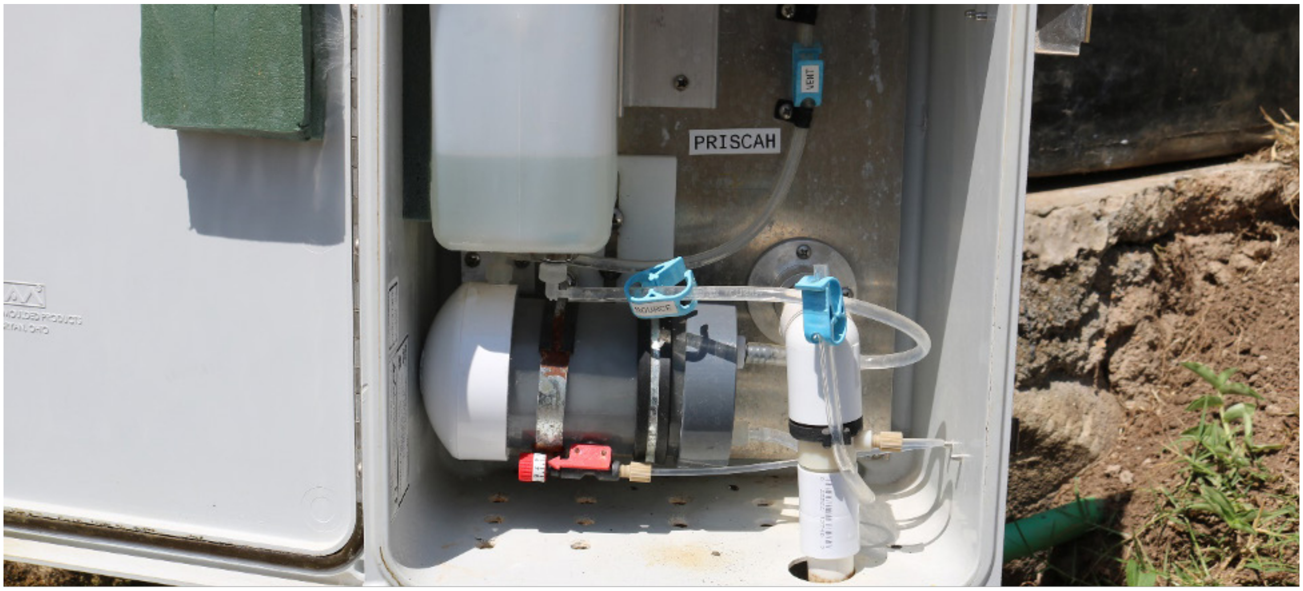
Applying the TIDieR-WASH Checklist to CARE Kenya's Passive Inline Chlorination Pilot and Trial Intervention in Healthcare Facilities

Background of CARE Program

CARE Kenya, in partnership with the University of California, Berkeley (UCB) and local government institutions, implemented a passive inline chlorination intervention in healthcare facilities across Western Kenya. The intervention aims to improve access to safe drinking water by introducing cost-effective, technology-driven water treatment methods. This program aligns with CARE's broader objectives of strengthening water, sanitation, and hygiene (WASH) systems to reduce waterborne diseases and improve maternal and neonatal health outcomes.

Summary of Methods Used to Develop the Checklist Report

The checklist case study was developed by Mwanzia Kioko, Chlorination Operations Project Officer and Samwel Ouko, Program Manager from CARE Kenya, and Kelly Alexander, Deputy Director Water+ CARE USA using a combination of project documents, activity reports, donor reports, and prior evaluations. The case study synthesizes details from ongoing program implementation (November 2022-May 2026). Each reporting item within the case study is summarized based on implementation details documented in project reports, following the guidance provided by the TIDieR-WASH Checklist. These summaries are intended to illustrate case study examples for each item in the checklist. More comprehensive details on the intervention can be found in the original project reports.



A close-up of an automated chlorine dosing device installed at a water system. Such systems help ensure consistent water disinfection, improving the safety and reliability of community water supplies.

Description of the Intervention Using the Checklist

1. Name

Provide a name or phrase that describes the intervention.

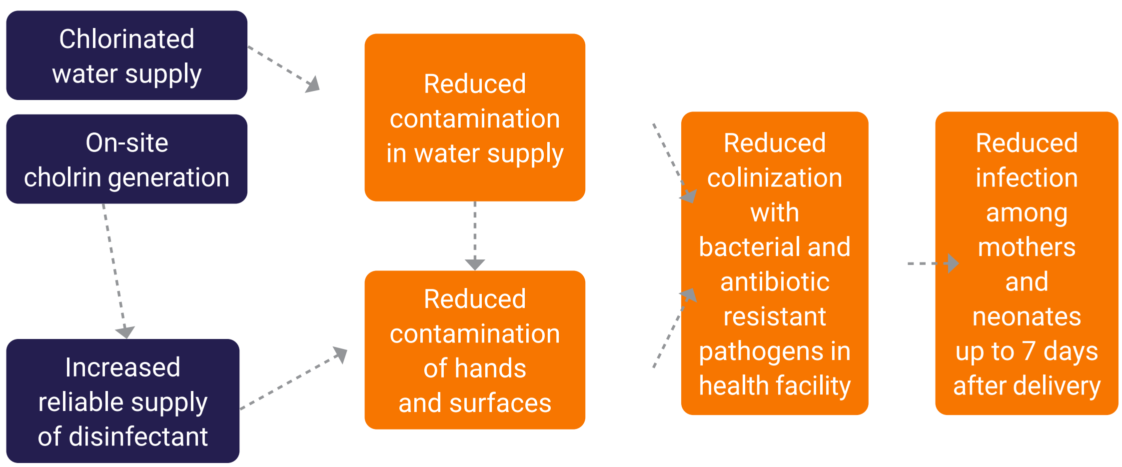
Piloting and testing UCB's passive inline chlorination technology in healthcare facilities across Western Kenya.

2. Theory of change

Describe how the intervention is expected to affect the target outcomes.

The intervention, piloted and tested through a multi-phase approach, enables a transition from manual chlorination to automated, cost-effective bulk water treatment. Initial prototype testing of passive inline chlorinators informed the design of a randomized control trial, which focused on chlorinating water in healthcare facilities. A causal pathway was established, demonstrating that access to consistently chlorinated water leads to improved water quality, which in turn reduces the risk of infections among neonatal and maternal populations.

The intervention transitions from manual to automated chlorination, improving water quality and reducing infection risks in healthcare settings.



3. Prior evidence

Describe any prior effectiveness evidence for this or related interventions.

Studies in Bangladesh demonstrated that passive inline chlorination led to a 23% reduction in diarrheal cases among children, providing evidence for its public health impact.[1] Additionally, research conducted in Kisumu revealed that 66% of users reported collecting chlorinated water from a water kiosk, highlighting increased consumer trust and preference.[2] This research also indicated a growing demand for lease-to-own purchase terms for passive inline chlorinators, suggesting potential scalability and long-term sustainability of the intervention.

Evidence shows passive chlorination reduces child diarrhea, builds user trust, and supports scalable, sustainable adoption.

1 Pickering, Amy J., et al. "Effect of in-line drinking water chlorination at the point of collection on child diarrhoea in urban Bangladesh: a double-blind, cluster-randomised controlled trial." The Lancet Global Health 7.9 (2019): e1247-e1256.

2 Lindmark, Megan, et al. "Passive in-line chlorination for drinking water disinfection: a critical review." Environmental science & technology 56.13 (2022): 9164-9181.

4. Location and setting

List the geographical locations and settings where implementation occurred.
Implemented in healthcare facilities in Kisumu, Busia, and Migori counties in Western Kenya.

5. Context

Detail all known relevant contextual factors for each location reached by the intervention.
The program operates in areas considering various contextual factors:

Site selection considered water quality, infrastructure, community trust, economic feasibility, and government support to ensure effective and sustainable chlorination.

- Healthcare facilities were selected based on specific water quality parameters essential for the effective operation of passive chlorination systems such as those with piped unchlorinated water or rainwater harvesting storage tanks. Additionally, parameters included turbidity levels below 5 NTU to ensure optimal chlorine efficacy and the absence of free chlorine residual in the water supply, indicating the need for improved treatment.
- Social factors such as community trust in centralized water treatment systems and economic considerations, including healthcare facility administrators' willingness to pay—meaning they commit to personnel and a budget for chlorine and spare parts. Environmental factors, such as seasonal variations in water quality and the availability of infrastructure for water distribution, influenced the feasibility of chlorination.
- Governmental factors, including local government support for intervention scale-up, and institutional frameworks for health and water services, played a crucial role in the implementation and sustainability of the intervention.

6. Suitability

Justify why the intervention is relevant and appropriate for where it was implemented.
The intervention targets the communities that need to be transitioned from point-of-use (POU) water treatment methods, which require individuals to treat water at the household level using products such as powdered water purifiers; to sustainable Point-of-collection (POC) approaches, where water is treated at centralized collection points before distribution. The POU approach has relied on a donor-dependent model, limiting long-term sustainability, whereas the POC approach leverages co-investment with devolved health and water departments to ensure wider reach and better water quality management. This transition, supported by local government partnerships, ensures a more reliable and scalable water treatment solution that reduces the burden on individual households and improves overall water quality at the community level. Additionally, the intervention aligns with efforts to establish community-led water safety solutions, reinforcing its sustainability by funding water treatment products through increased water sales revenue due to improved access to quality drinking water.

The intervention shifts communities from household water treatment to sustainable, centralized point-of-collection systems through local co-investment and improved water quality management.

CARE Kenya led implementation with UCB, KEMRI, REMIT, and government partners supporting design, research, monitoring, and policy integration.

7. Implementers

List all the institutions who provided each intervention or type of activity.

CARE Kenya led the implementation of the intervention, working closely with multiple stakeholders to ensure its success. UCB played a critical role in designing and testing the prototype of passive inline chlorinators before deployment. The Kenya Medical Research Institute conducted clinical trials and analyzed data to assess the intervention's impact. REMIT Kenya was responsible for data collection and field management, ensuring robust monitoring of the intervention's effectiveness. National and County Governments provided the necessary policy support and approvals, facilitating institutional adoption and integration into the local water systems. NACOSTI, the National Commission on Science and Technology, issued study permits, while the Institutional Review Boards at KEMRI (SERU) and Maseno University ensured ethical compliance, approving protocols and overseeing participant protections throughout the study.

Passive chlorinators provided chlorinated water to 4,539 monthly recipients across four healthcare facilities in Western Kenya.

8. Recipients

Report the number of recipients or the population reached, and descriptive statistics of those recipients.

Since the start of the pilot program for passive chlorinators in Western Kenya, an average of 4,539 (4,500 female, 39 male) recipients per month have benefited from chlorinated water in healthcare facilities. These recipients are community members living within the catchment areas of four healthcare facilities in Busia, Kisumu, and Migori counties.

The intervention targeted high-volume healthcare facilities to reduce neonatal and maternal infections through reliable chlorinated water supply.

9. Targeting

Report whether any intervention components were targeted to specific subpopulations, how they were targeted, and how the target subpopulations were identified.

The intervention specifically targeted healthcare facilities to address neonatal and maternal infections by ensuring a reliable supply of chlorinated water for both drinking and sanitation purposes. These facilities were selected based on their high patient turnover, particularly among pregnant women and newborns, and their need for improved infection prevention measures. The intervention aimed to reduce the prevalence of waterborne infections, including neonatal and maternal sepsis, by integrating passive chlorination into routine facility water management practices.

10. Activities

Provide a clear, detailed description of the activities included, their procedures, and supporting activities.

The intervention's piloting phase involved the installation of passive inline chlorination systems in healthcare facilities, ensuring a structured transition from manual chlorination to automated bulk water treatment. Technical and operational support activities included regular monitoring of free chlorine residuals (FCR), systematic data collection and reporting, and troubleshooting of chlorination systems to maintain consistent performance. User satisfaction surveys were conducted among healthcare workers and patients to gather feedback on the system's effectiveness and usability. Continuous stakeholder engagement with local government officials, health facility managers, and community leaders was crucial for fostering support, refining implementation strategies, and planning for scalability. Additionally, the intervention included a clinical trial phase aimed at influencing health policies. This involved securing approvals from national and county research agencies, selecting facilities with high birth rates to establish a study sample, and installing both passive inline chlorinators and electrochlorinators in experimental sites. Mothers and their neonates were enrolled in experimental and control groups, with clinical investigations of vaginal and rectal specimens conducted to assess the presence of drug-resistant and environmentally acquired infections in healthcare settings. Findings from this rigorous evaluation will inform policy recommendations and guide the broader adoption of passive chlorination technologies.

The pilot installed passive chlorinators in healthcare facilities, paired with monitoring, user feedback, and a clinical trial to inform policy and scale-up.

11. Intervention dose

Quantify the frequency and number of contacts between implementers and recipients, and the duration of those contacts.

Chlorination is maintained continuously at healthcare facilities, ensuring a consistent supply of safe drinking water. Implementers conduct site visits 1-2 times per month to monitor free chlorine residual levels, troubleshoot technical issues, assess system functionality, and collect feedback from facility staff and users. These visits also include stakeholder engagements to facilitate the ongoing adoption and scale-up of the intervention.

Chlorination is maintained continuously with monthly site visits for monitoring, troubleshooting, and stakeholder engagement.

A woman fetches water from a community water point. Access to nearby water points reduces time and physical strain, enabling more time for other livelihoods and caregiving responsibilities.

The intervention used user-centered design and fidelity monitoring to refine TuriTap, a robust, user-friendly chlorination system now commercially available.

12. Fidelity

Report fidelity monitoring and actual fidelity. Include any planned or unplanned modifications to the intervention.

The intervention evolved through a user-centered design process, incorporating feedback from healthcare facility staff, patients, and implementing partners, with data recorded in Survey CTO. This iterative approach ensured the chlorination technology was refined for ease of use, efficiency, and integration within existing water supply systems. The process included multiple prototype testing phases, monitoring of operational challenges, and adaptations to improve effectiveness. Fidelity monitoring involved systematic assessments of free chlorine residuals, regular inspections of system functionality, and adherence to established operational protocols. Additionally, any planned or unplanned modifications, such as adjustments in chlorine dosing mechanisms based on water quality fluctuations, were documented and addressed. The final product iteration was informed by data collected from systematic performance evaluations and user satisfaction surveys, ensuring the technology was both technically robust and user-friendly while maintaining high fidelity to the intervention design. The now trademarked and commercially available TuriTap is the final product.

Program costs were distributed across stakeholder engagement, personnel, materials, and capacity building.

13. Costs

Report the program costs by activity category and input type.

A full financial breakdown is available in the supporting documentation. The approximate cost distribution below reflects the allocation of program resources across key activity categories and inputs:

- Materials, installation and chlorine procurement – 15%
- Monitoring and research – 6%
- Stakeholder engagement – 20%
- Capacity-building efforts – 15%
- Personnel – 20%
- Transportation – 9%
- Training materials – 2%
- Office operations and overhead – 13%

Materials include chlorinators, disinfectants, testing kits, and training tools to support effective and scalable water treatment.

14. Materials

Describe all materials delivered as part of the intervention or used to guide the intervention.

Materials include passive inline chlorinators for automated water treatment, chlorine solution for disinfection, sodium chloride salt used in the electrochlorination process, and vinegar for cleaning electrochlorinators to maintain system efficiency. Additional materials include water quality testing kits to monitor free chlorine residuals, training manuals for facility staff on proper system use and maintenance, and data collection tools for tracking intervention impact. These materials ensure the effectiveness, sustainability, and scalability of the passive chlorination intervention.