Evaluating Household Water Treatment Filters in Emergency Contexts

Household water treatment is essential to ensure drinking water safety in humanitarian emergencies. An interdisciplinary team is assessing water treatment devices in emergency contexts to identify filter designs that better meet the needs of vulnerable populations. M. Peter[1], R. Meierhofer[2], J. Affolter[3], F. Ochieng[3], I. Garino[4], M. Caniato[4], M. Verber[4], S. Marks[2]

Introduction

Household water treatment and safe storage (HWTS) devices are essential in humanitarian emergencies to improve drinking water quality and protect health [1, 2]. Their technical efficacy has been well documented through laboratory testing [3]; however, evidence that HWTS products (particularly drinking water filters) are used correctly and consistently in emergency contexts is limited [4]. To improve humanitarian agencies' ability to procure and distribute the most suitable products and to motivate manufacturers to adapt their design for emergency situations, Elrha's Humanitarian Innovation Fund initiated a 1.5 year field study. It is evaluating five HWTS devices: two ceramic filters, two ultrafiltration membranes, and one ceramic filter with bromine-releasing post treatment. Evaluation criteria include technical performance, consistency of correct use, and users' preferred design improvements. These results will be delivered to the filter manufacturers to encourage optimisation of their products.

Study sites and methods

The filters are being tested in three emergency settings: occupied Palestinian territories (oPt), Marsabit County in Northern Kenya, and the Tabelha Settlement in Somalia. Each site is characterised by different humanitarian conditions: in oPt, a man-made protracted emergency; Northern Kenya, a severely drought-affected pastoralist area; and Somalia, an acute crisis with informal refugee camps. The water used by the local population is known to be contaminated at the point of consumption. Cesvi is managing the project in oPt and Somalia, and Caritas in Northern Kenya.

Four to five filter types were distributed to 60 (Somalia) and 150 (oPt and Kenya) households. Filters are being evaluated over nine months through three activities. First, a monthly assessment of technical performance is done, i.e. filter integrity, microbial removal efficiency, microbial recontamination, and volume of treated water. Second, a user-centred evaluation based on structured observations and videography, focus group discussions, semi-structured interviews and a co-design workshop is completed. Third, a multi-criteria decision analysis with partners and relevant international stakeholders is done to allow for final informed choice of filters and their features. Comparative assessment is made possible by delivery of two household water filters sequentially to each household (Figure 1).

Preliminary results and next steps

In oPt and Kenya, the filters were distributed and two monitoring rounds completed (Photo 1). In Kenya, only 15 out of 125 households could assemble the filters correctly and avoid leakage or re-contamination. In general, filters with larger water storage containers were preferred by families. In oPt, the average log removal values (LRVs) for Enterococci bacteria for the two ceramic filters were 2.89 and 3.01, while both membrane filters and the ceramic filter with bromine-based post-treatment acheived average LRVs of 3.96 to 4.29. In oPt and Kenya, the third monitoring period is ongoing. Following filter switching, focus group discussions are planned to comparatively assess each filter type. In Somalia, the eviction of refugees from the informal camps delayed the start of the study, and the baseline will be conducted at a different site.

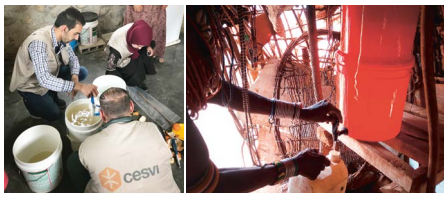

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Photo 1: Filter distribution and use in occupied Palestinian territories and Marsabit County, Kenya.

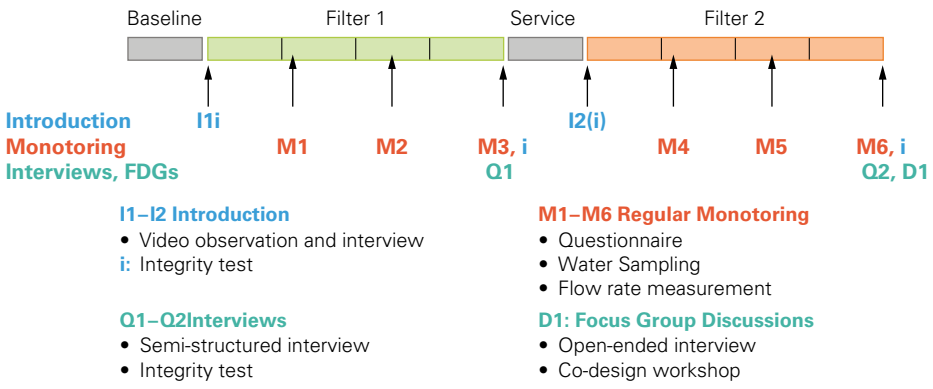

Figure 1: Study design over a 9 month period at each field site.

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