

## Evidence Assessment: Summary of a Systematic Review

### Who is this summary for?

This evidence assessment is for Teachers, Doctors, Health Personnel, Community Health Workers and the partners involved in child health and water safety.

## Interventions to improve water quality for preventing diarrhoea

### Key findings

- Water filtration at home probably reduces diarrhoea by around a half, and effects were consistently seen with ceramic filters.
- In low-income settings, distributing plastic bottles with instructions to leave filled bottles in direct sunlight for at least six hours before drinking probably reduces diarrhoea by around a third.

### Background

Diarrhoea is a major cause of death and disease, especially among young children in low-income countries where the most common causes are faecally contaminated water and food, or poor hygiene practices. In remote and low-income settings, source-based water quality improvement may include providing protected groundwater or harvested rainwater as an alternative to surface sources. Alternatively water may be treated at the point-of-use in people's homes by boiling, chlorination, flocculation, filtration, or solar disinfection. These point-of-use interventions have the potential to overcome both contaminated sources and recontamination of safe water in the home.

### Question

What is the effectiveness of interventions to improve water quality for preventing diarrhoea?

**Interventions to improve water quality for preventing diarrhoea in Cameroon:** According to the 2011 Demographic and Health survey, 21% of children under 5 suffer from diarrhoea in Cameroon and only 49% of the population have access to safe drinking water (DSCE, 2009). Special training sessions are regularly organised on water treatment with practical demonstrations. These interventions could reduce the number of cases of diarrhoea among children in Cameroon.

**Table 1: Summary of the systematic review**

|   | What the review authors searched for  | What the review authors found  |
|---|---|--|
| <b>Studies</b>  | Cluster-randomized controlled trials (cluster-RCTs), quasi-randomized controlled trials (quasi-RCTs) and controlled before-and-after studies (CBAs).  | Forty-five studies were cluster-RCTs, two were quasi-RCTs, and eight were CBA studies met the inclusion criteria.  |
| <b>Participants</b>   | Children and adults   | Children under five years and adults   |
| <b>Interventions</b>  | Any intervention aimed at improving the microbiological quality of drinking water. Interventions that combined improvements in water quality with hygiene or health promotion, but excluded studies that combined water quality interventions with other water, sanitation, and hygiene (WASH) interventions, such as improvements in water quantity or sanitation. | Eight studies evaluated source-based interventions: improved wells or boreholes or improved community sources and distribution to public tap stands. Forty-seven studies evaluated point-of-use interventions: chlorination, filtration, combined flocculation and disinfection (five studies), SODIS solar disinfection, combination UV disinfection and filtration (one study), and improved storage, there were no eligible studies that investigated the impact of boiling, even though that is by far the most common type of POU water treatment. Many studies provided a supplementary hygiene education or instruction beyond the use of the intervention itself, and among point-of-use interventions the primary intervention was often combined with some form of improved storage. |
| <b>Controls</b>   | No intervention, or a dummy intervention  | No hand washing promotion  |
| <b>Outcomes</b>   | <p><b>Primary outcomes</b></p> <ul style="list-style-type: none"> <li>Diarrhoea episodes among individuals, whether or not confirmed by microbiological examination.</li> </ul> <p><b>Secondary outcomes</b></p> <ul style="list-style-type: none"> <li>Death.</li> <li>Adverse events.</li> </ul>  | <p>The outcomes reported were:</p> <ul style="list-style-type: none"> <li>Episodes of diarrhoea;</li> <li>Mortality;</li> <li>Adverse events</li> </ul>  |
| <b>Date of the most recent search</b> 11 November 2014.   |   |  |
| <b>Limitations:</b> This is a high quality systematic review, <b>AMSTAR =10/11</b>  |   |  |
| <b>Citation:</b> Clasen TF, Alexander KT, Sinclair D, Boisson S, Peletz R, Chang HH, Majorin F, Cairncross S. Interventions to improve water quality for preventing diarrhoea. Cochrane Database of Systematic Reviews 2015, Issue 10. Art. No.: CD004794. DOI: 10.1002/14651858.CD004794.pub3. |   |  |

**Table 2: Summary of findings**

| <b>Point-of-use water quality interventions for preventing diarrhoea in rural settings in low- and middle-income countries</b> |                                 |                                     |  |
|--|---------------------------------|-------------------------------------|--|
| <b>Patient or population:</b> adults and children  |                                 |                                     |  |
| <b>Settings:</b> rural areas in low- and middle-income countries   |                                 |                                     |  |
| <b>Intervention:</b> point of use water quality interventions  |                                 |                                     |  |
| <b>Comparison:</b> , No hand washing promotion   |                                 |                                     |  |
| <b>Outcomes</b>  | <b>Relative effect (95% CI)</b> | <b>No of Participants (studies)</b> | <b>Quality of the evidence (GRADE)</b> |
| <b>Episodes of diarrhoea</b>   |                                 |                                     |  |
| <b>Chlorination</b>  | 0.77<br>[0.65-0.91]             | 30 746<br>(14)                      | Low                                    |
| <b>Flocculation/disinfection</b>   | 0.69<br>[0.58-0.82]             | 11 788<br>(4)                       | Moderate                               |
| <b>Filtration</b>  | 0.48<br>[0.38-0.59]             | 15 582<br>(18)                      | Moderate                               |
| <b>Solar disinfection (SODIS)</b>  | 0.62<br>[0.42-0.94]             | 3460<br>(4)                         | Moderate                               |

## Applicability

Most of the included studies were undertaken in lower middle or low-income countries, but three studies were conducted in the USA, one in Australia, and one in Saudi Arabia. Five studies were conducted in urban settings, five in peri-urban settings, two in informal urban or squatter settlements, two in camps for refugees or displaced persons, five in multiple settings, and the others in villages or other rural settings. These interventions may be applied in other low resources settings such as Cameroon.

## Conclusions

Interventions that address the microbial contamination of water at the point-of-use may be important interim measures to improve drinking water quality until homes can be reached with safe, reliable, piped-in water connections.

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