

Assessing Long-Term Sustainability of Former Eawag HWTS Projects

Sandec's commitment to household water treatment projects has a long-standing tradition, especially the widely promoted solar water disinfection (SODIS) method. But what are the long-term benefits several years after project conclusion? A three-country comparison reveals that Household Water Treatment and Safe Storage (HWTS) use is quite widespread; yet, consumption of untreated water still persists.

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Diarrhoeal diseases are still one of the main direct or indirect causes of child mortality. Water treatment at household level (HWTS) is an option to reducing transmission of water-borne, diarrhoea-causing diseases and thus child mortality [1].

Since 2000, Eawag has been actively supporting HWTS promotion projects mainly implemented by local partner organisations. A long-term partnership initiated with a number of these nationally operating NGOs has led to numerous small subprojects usually lasting 12 months.

The current study examines sustainability of a number of randomly selected subprojects in three key countries: Nepal, Indonesia and Bolivia. A large number of different subprojects were implemented in these countries by various government and non-governmental organisations during different time frames. The objective of the study is to compare the levels of HWTS use and identify hindering and facilitating factors in the three countries.

Project assessment

We visited around ten different HWTS promotion projects in Nepal and Bolivia, and assessed two projects in Indonesia. Questionnaires were used to interview about 1000 households per country, and additional information was collected from previous promoters and project staff, as well as from sector professionals.

In **Nepal**, all the projects were implemented in the quite densely populated Kathmandu valley by different NGOs, municipalities and department health services. The projects were concluded between 2005 and 2009 over a project time frame of always one year. In **Indonesia**, the projects were implemented on two islands, Lombok and Flores. On Lombok, the project was conducted between 2004 and 2005 over a period of one year; on Flores, the project was implemented between 2005 and 2010 over two to four years. Implementation was always carried out by

one NGO in cooperation with local health clinics. In **Bolivia**, most selected projects were conducted throughout the country's remote Andean highland regions by various NGOs, municipalities and one department health service. Implementation lasted between 2001 and 2008 over a period of one to three years. Except for Bolivia, where no urban projects were conducted, we examined rural, peri-urban and urban communities in all the studied countries.

Overall water consumption pattern

The inhabitants of the three studied countries consume a variety of different water types, i.e. untreated and all types of treated water (filtered, SODIS-disinfected, boiled, chlorinated, and purchased) (Photo 1). A project is considered successful if a high percentage of the population consumes **only** treated water. In Indonesia, 73 % of the households treat all their drinking water, while in Nepal and Bolivia this number is significantly lower (53 % and 48 %). However, these percentages differ widely

among the various communities within one country. In Nepal, success rates range from 16 % to 100 %, in Indonesia from 17 % to 96 % and in Bolivia from 14 % to 75 %.

Aside from households treating all their drinking water, some households use HWTS option(s), but still consume untreated water regularly. This number was far higher in Bolivia than in Nepal or Indonesia (31 % versus 14 % and 12 %). It seems that in the latter two countries the inhabitants have realised that consuming only treated water mitigates successfully water-borne diseases. The remainder of the population consumes only untreated water. This percentage is much higher in Nepal than in Indonesia or Bolivia (33 % versus 15 % and 21 %).

When examining the different HWTS options used in the three countries, we identified clear preferences (Fig. 1). While candle filters are used by 42 % of the households in Nepal, filters are neither used in Indonesia nor in Bolivia. Instead, Indonesians have a clear preference for

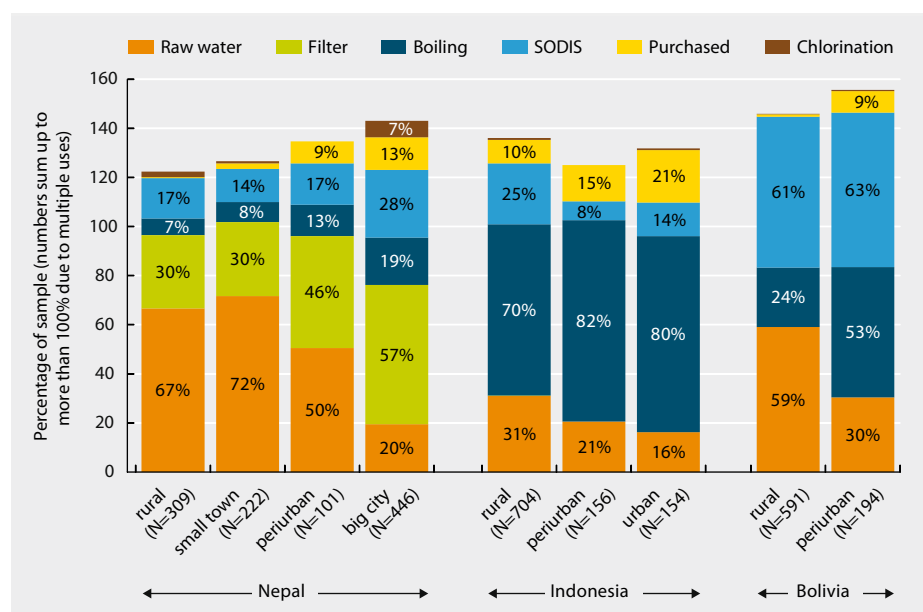


Figure 1: Water consumption of different populations in Nepal, Indonesia and Bolivia.

boiling water (73 %) and Bolivians favour the use of SODIS (62 %). The second preferred choice by the Nepalese and Indonesians is SODIS with 21 % of all households; in Bolivia, 31 % boil their water. Chlorination is not accepted in any of the evaluated areas mainly on account of the water taste.

Different HWTS promotional aspects

In Nepal, **filters** are readily available and actively marketed. In urban and peri-urban Kathmandu, 55 % of the households use a filter, while in small towns and rural villages still 30 % use filters [2]. Filters are the preferred option over SODIS or boiling, possibly because they are more user-friendly. However, households often do not change the candle filter unit regularly – a prerequisite to obtain safe water. Users treat between 50 % and 100 % of their drinking water with the filter, the remainder is mostly boiled or treated with SODIS. In contrast to Nepal, filters are neither promoted nor available in Indonesia or Bolivia.

In Indonesia, **boiling** water has been promoted for decades by government health services. In most villages on Flores, boiling is practised by 75–100 % of the households; on Lombok 60 % of the people boil their water. This method is exclusively used by two thirds of the households. However, known drawbacks of boiling are its high cost and lack of safe storage after boiling. Though exclusive boiling is also practised by some households in Nepal, the population seems to have replaced boiling by filter use. In Bolivia, boiling is practised by 53 % of the peri-urban population, but only used by 24 % of the rural households for reasons of unavailable combustibles in rural areas.

SODIS is used by 62 % of the rural and peri-urban households in Bolivia [3]. This method has now been adopted by most NGOs promoting HWTS. Especially in sparsely populated rural areas, SODIS is often the only method used, as other alternatives are not available. Of the SODIS users, 74 % are regular and 26 % irregular users. In rural areas, SODIS has replaced untreated water consumption, while in peri-urban areas it has the potential to replace boiling, as gas bottles are often perceived as quite costly. SODIS is also used by 21 % of the households in Nepal and Indonesia. In Nepal, SODIS is more readily adopted in large urban areas, and more widespread



Photo 1: Public water outlet in Patan, Nepal.

among rural households in Indonesia. In all three countries, households using SODIS do not treat all their water with this method, but complement it with boiling, filter use (only in Nepal) or untreated water consumption.

Rural-urban differences and promotional influence

In **Nepal**, not only filters, but also SODIS and boiling are more widespread in large urban areas. Almost none of the households consume untreated water in large urban communities (0–20 % of households) as opposed to peri-urban, rural and small town communities (up to 72 % of households). Rural spring sources and treated tap water in small towns are often falsely perceived to be clean. No differences were found with regard to HWTS use between low- and high-income areas (only large cities) or government implementers and NGOs. However, in rural areas, government structures seem to be reaching further than NGOs. No correlation was found between HWTS use and year of promotion.

In **Indonesia**, fewer households use boiling and SODIS on Lombok, but more households consume untreated water than on Flores. However, the project on Flores was implemented in later years and lasted over a longer period. SODIS use varies strongly between villages on both islands (from 0 to 92 % of households) and is practised more in rural areas. High SODIS use was often associated with ongoing activities of local leaders. Since bottles had been provided for free during the projects, many inhabitants now refuse to pay for them and have therefore stopped using SODIS. In addition to boiling or SODIS use, 12 % buy water from small, non-branded drinking water refill depots selling water of varying quality.

While SODIS is equally popular in rural and peri-urban areas of **Bolivia**, boiling is twice as popular in peri-urban as in rural areas. However, even in peri-urban areas, 30 % of the households still consume untreated water at times; in rural areas this number is as high as 59 %. The combination of partly using SODIS and partly boiling water is very common. SODIS use is complemented with boiling by 42 % of the peri-urban households, and still by 22 % of the rural households. Compared to Nepal, HWTS promotion by government institutions in rural areas of Bolivia has been slightly more successful than by NGOs. Longer project duration yielded lower rates of households consuming untreated water.

Conclusions

It is a real challenge to encourage all community members to entirely abstain from consuming untreated water. In Indonesia, with its lowest level of untreated water consumption, water boiling required decades of promotional activity. The improvement potential of HWTS use therefore prevails in most communities of the three countries. Since combined use of different HWTS methods is rather common, promotion of a mix of locally accepted HWTS methods is required to allow people to make informed choices. As promotion by government institutions can be highly successful, their involvement in ongoing projects is fundamental for sustainable and long-term HWTS promotional efforts.

- [1] WHO (2007): Combating waterborne disease at the household level. Geneva: WHO.
- [2] Tamas, A., and Meierhofer, R. (2010): How to achieve sustainable behavior change: Assessing the long-term effect of HWT promotion in Nepal. Paper presented at the Water and Health 2010, 25–26 October, Chapel Hill, USA.
- [3] Tamas, A. (2011): Drivers of sustainable application of Solar Water Disinfection in Bolivia. Paper presented at the 35th WEDC International Conference, Loughborough, UK.

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We would like to thank the local NGOs ENPHO (Nepal), YDD (Indonesia) and the Fundación SODIS (Bolivia) for their support in data collection. Financial backing was provided by the Velux Foundation and by the SODIS Reference Centre at Eawag.

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