Filters for the World

By Lieselotte Heederik

POU filters provide clean water for developing nations

Today, 4,100 children will die from drinking dirty water. This will happen again tomorrow, and the next day as well. In order to stop this tragedy, the United Nations has formulated Millennium Development Goals, which aim to halve the number of people without sustainable access to safe drinking water and basic sanitation by 2015.[1] In 2012, the World Health Organization (WHO) reported that this goal was reached, as more than 2 billion people had obtained access to safe drinking water.[2]

The key to reaching this lofty goal is ensuring that water is safe to drink, meaning that it must be free of harmful pathogens. The methods used to increase access to water, such as pipe, tubes, pumps and wells do not guarantee the quality of the water. Although the target was met in 2012, a child still dies from a waterborne disease, such as diarrhea, every 21 seconds.[3]

POU filtration can provide an easy-to-use water treatment solution in countries like Indonesia, where many residents do not have access to safe drinking water.

Limited Options

To stop this humanitarian disaster, more attention needs to be directed to the quality of the water that people in the poorest areas of the world consume. In the developed world, most people get safe drinking water delivered to their homes from municipal water treatment plants through piping systems. It would be ideal if everyone in the world had access to piped-in drinking water, but it will take decades, if not centuries, to build the infrastructure to make that possible. Point-of-use (POU) water purification solutions provide a cheaper and faster solution to reach households in developing nations.

Because most people in developing countries cannot afford bottled water, their options are to boil the water, put it in PET bottles in the sun for more than 6 hours (a method called solar water disinfection, or SODIS), use chemical disinfectants like chlorine, or use filtration. Wood fires, a common method of boiling water, can not only exacerbate respiratory diseases and increase CO_2 emissions, but also put additional labor pressure on women to find firewood.[4] Furthermore, WHO found that almost 50% of boiled water is re-contaminated, because it is often stored in open pots and pans, and many people do not wash their hands with soap.[5] SODIS only works when the sun shines. Chlorination is another option, but, in general, people do not like the taste of chlorine. In addition, boiling, SODIS and chlorine can only be used with clear (non-turbid) water, because these methods do not remove color and other particles.

In several countries, such as Cambodia, Guatemala and Nicaragua, ceramic filter pots made with a combination of clay, rice husks and silver are used to disinfect water. Laboratory tests show that these ceramic pots have effective pathogen removal of 99.9%, but they are big and heavy, which makes transportation over long distances challenging.[6]

POU Potential

POU solutions for purifying water for developing nations should not only be effective and affordable, but attractive as well. Although $20 per filter may seem cheap to Americans, it is a large investment for a household that lives off of less than $200 per year. The product should not only look good, but come in diverse colors and models so that these households can choose which product best fits their needs. To enable scaling up in a large area, the products also should be easily transportable. Needless to say, they should not require electricity and should be easy to assemble, use and maintain.

Criteria to provide safe drinking water to developing nations include:

- Effectiveness;
- Affordability;
- Attractiveness;
- Customization;
- Ease of transport;
- Ease of installation, use and maintainance;
- No need for electricity; and
- Ease of obtaining and replacing.

How can these criteria be adapted to the field? Take Indonesia. With more than 240 million people, it is the fourth most populous country in the world. It includes more than 17,000 islands, which create a logistical challenge.

A majority of Indonesia residents do not have safe, potable water in their homes. In fact, 150 million of them—more than the total population of Russia—struggle for access to safe drinking water. Seventy percent of households use water straight from a well, without treating it for bacteria,

turbidity or contaminants. Due to poor infrastructure maintenance, municipal water sources also may contain bacteria, making the water unsafe for consumption.[7]

Most people boil their water, and, if they can afford it, purchase bottled water. Boiling water on gas costs $9 per 1,000 liters, and buying bottled water costs $24 per 1,000 liters, which could add up to more than $120 per family per year. Many bottle refill stations are not properly maintained, and owners do not have incentive to invest in water tests or improved filtration. As there is no certification or quality control for these bottled water refill stations, the ministry of health recommends boiling the water before consumption.[8]

Nazava water filters use ceramic filtration technology to purify water.

Simple Solutions

A new product has recently been introduced on the market in Indonesia. Nazava water filters use a simple ceramic filter shaped like a soda can. The ceramic is impregnated with silver and filled with activated carbon, which helps improve the water's taste. The filter's small size makes it easy to transport, and, as its costs per liter are three times cheaper than boiling water and nine times cheaper than bottled water, the economic benefits are high.

Nazava filters have 99.99% effective bacterial removal. They have been tested in 16 laboratories in Indonesia and overseas. They comply with Indonesian standards for safe drinking water and WHO guidelines for bacteria removal.[9] To address the preferences of every household, the filters come in different sizes and colors.

Nazava filters can make well, rain and tap water drinkable without boiling it first. As no fuel wood is needed, they reduce the labor burden on women. Using them also can result in significant savings in gas and kerosene. They purify turbid water as well, as long as the water is fresh.

It is not only the technology that matters, though. In order to save lives and reach the most remote areas, distribution is just as important. A network of micro-entrepreneurs sells the filters in their respective communities. Nazava provides incentives, training, credit and supporting materials to the entrepreneurs to help their businesses grow. It also uses mobile technology for data collection and marketing. Most water filters are sold by female entrepreneurs, giving them employment opportunities, business skills and access to additional income.

In a recent NSF Intl. survey of U.S. residents, 44% of respondents said they have water filters in their homes. In order to save lives, people in the poorest regions of the world also should have access to affordable and effective solutions that not only improve access to water, but also water quality. *wqp*

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4. *Quantitative data from East Indonesia show that women spend 24 hours per month collecting wood and 30 hours per month boiling water for drinking (Sihotang 2012, http://kopernik.info/sites/default/files/BASELINE%20SURVEY%20PEKKA%20NTT%20RESULT%20FINAL_0.pdf). This implies that in Indonesia alone, 4.2 million FTE (full time equivalent) of women's labor time per year are lost to fetching wood and boiling water; this equals the labor force of all employees of McDonalds (including all franchises) and Walmart together.*
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