Water, Water Everywhere...

The LifeStraw looks simple. But it has the potential to save many lives.

By Jilian Mincer

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Mikkel Vestergaard Frandsen didn't set out to help millions of people get access to safe drinking water. At the age of 19, he dropped out of school and moved to Nigeria to sell trucks.

But when a political coup forced him to leave Africa and return to his native Denmark in 1992, he reluctantly agreed to join the family textile business -- if he could focus on relief-aid products.

* See the complete [Product Design](http://online.wsj.com/public/page/2_1585.html) report.

His experience in Africa and later working with the Carter Center in Atlanta, a human-rights organization founded by former President Jimmy Carter and his wife, Rosalynn, convinced him that people in developing countries needed a simple, durable device to purify water.

The result was the LifeStraw, a personal, portable water purifier that eliminates virtually all waterborne bacteria and most viruses responsible for causing diarrheal diseases. The product, which costs as little as $3, has won a number of awards, including the 2008 Saatchi & Saatchi Award for World Changing Ideas.

"The LifeStraw empowers people so they don't have to wait for the government to come up with solutions," says Mr. Frandsen, who is now 36 and president and chief executive officer of the family's Lausanne, Switzerland-based company, Vestergaard Frandsen, which manufactures the LifeStraw.

The light blue straw with a resilient polystyrene shell looks like a child's musical recorder. When someone sucks through the straw, the water flows through textile and iodine filters, which kill off viruses and bacteria such as E. coli.

The company says nongovernmental organizations and nonprofit agencies already have bought hundreds of thousands of the drinking tubes and are distributing them in countries with unsafe drinking water.

Aid groups also are buying them for communities devastated by natural disasters. Demand has been so high for LifeStraws in Myanmar, which was ravaged by a cyclone last month, and China, which was hit with an earthquake, that the two plants that manufacture the device are working around the clock to produce more, Vestergaard Frandsen says.

The U.S. government, faith-based organizations and nonprofit groups such as Convoy of Hope have sent 21,000 of the straws to Myanmar so far, and photos coming out of the country indicate they are reaching at least some of the people who need them, a company spokesman says. Vestergaard Frandsen eventually expects to provide 50,000 straws to both Myanmar and China, he says.

Jeff Nene, a spokesman for Convoy of Hope, says people in dire situations make the mistake of drinking dirty water, not realizing the impurities can cause diarrhea, dysentery and eventually death. "You can go for a long time without food," he says. "But you can't live long without water."

Planting the Seed

Founded in 1957 as a maker of fabric for work clothing, Vestergaard Frandsen shifted into relief-aid products such as blankets and tents in 1992, the year Mr. Frandsen joined the company. It eventually began making disease-control textiles such as the now widely distributed PermaNet, an insecticide-treated mosquito bed net that costs as little as $4 and doesn't need to be re-treated for three to four years.

It was while working in the mid-1990s on a project with the Carter Center to eradicate Guinea worm -- a parasite that enters the body through contaminated drinking water and eventually emerges through a very painful blister in the skin -- that Mr. Frandsen's interest in water-purification systems began. Vestergaard Frandsen provided materials for a drinking-pipe filter aimed at preventing people from swallowing the Guinea worm's larvae and suffering the misery of infection. After millions of the pipes were distributed, the number of Guinea worm cases plummeted to fewer than 10,000 world-wide in 2007 from 3.6 million in 1986, according to the Carter Center.

Mr. Frandsen says the fact that a disease that caused so much suffering could be prevented so easily got him thinking about other waterborne illnesses in the developing world. He rattles off the numbers: More than a billion people are without access to safe drinking water. Diarrhea kills more than 1.8 million people a year, and chronic diarrhea is the leading killer of people with AIDS.

"We started thinking, with 6,000 children dying a day from waterborne diseases, what could we do?" said Mr. Frandsen on a recent visit to the U.S.

He wanted to create a filter that could be used at the water source to reduce these diseases. It had to be easy to carry, and require no electricity, batteries or repairs.

Mr. Frandsen's father, Torben Vestergaard Frandsen, was involved in the early work on the design of the LifeStraw. When it was determined that the Guinea-worm pipe filter removed 96% to 97% of all cholera bacteria, the company thought developing a product to prevent cholera would be a "piece of cake," he says.

It wasn't. The 3% to 4% of the cholera bacteria that made it through the Guinea-worm pipe filter was too much to call drinking water safe. "That was when we embarked on a long line of development to make the product useful against a wide variety of waterborne viruses and bacteria," the elder Mr. Frandsen says in an email.

The company initially tried creating filters only from textiles, he says. But when it found they weren't entirely effective, it began experimenting with other substances, including iodine and carbon.

As far as the colors -- they weren't chosen by any designers or focus groups.

"I always loved turquoise and navy," says Torben Vestergaard Frandsen. "After all these years I managed to have a product in my favorite colors. Luckily, the color combination is not that bad for water."

The LifeStraw, introduced in 2005, is 10 inches long and weighs about 4.3 ounces. When someone sucks through the straw, the water flows through textile and iodine filters, which kill off bacteria and viruses. A second chamber consists of granulated active carbon that absorbs residual iodine, thereby improving the taste of the water.

The Real Test

The straw was tested at the University of North Carolina and tweaked by the company's engineers to decrease clogging and make it easier to clean, says Mark D. Sobsey, the professor who conducted the study.

One straw is capable of purifying at least 700 liters (182 gallons) of water, removing an estimated 99.9% of bacteria and 99% of waterborne viruses, which, while not perfect, is enough to significantly reduce the risk of infection and illness, according to Prof. Sobsey. The straw doesn't completely remove turbidity from water or make saline water potable. It also doesn't remove or filter heavy metals.

While LifeStraw's ability to filter out waterborne bacteria and viruses has been demonstrated in the lab, its effectiveness at reducing diarrheal illnesses in the field -- which depends on things such as whether people use the device consistently and correctly -- is still being measured. Thomas F. Clasen, a lecturer in the department of infectious and tropical disease at the London School of Hygiene and Tropical Medicine, expects to complete a study of the device among users in Ethiopia in the next several months. He declined to release details on data collected so far.

If the LifeStraw reduces diarrhea even 10% to 15%, it would be considered "an effective device," Prof. Sobsey says. If the reduction is 25% to 50%, then "we can declare it a victory," he says.

This year, Vestergaard Frandsen introduced the LifeStraw Family, a $15 water purifier that families can use at home. Families pour water into the purifier, which kills off parasites in addition to viruses and bacteria that cause diarrhea. It is designed to last long enough to provide about two years of clean drinking water for a family of six.

Although Vestergaard Frandsen, which is closely held, declines to provide sales figures for the LifeStraw or the LifeStraw Family, it does say that all of its products "are selling very robustly, and we have significant growth every year."

"There is no conflict between doing good and doing business," the younger Mr. Frandsen says.

—Ms. Mincer is a reporter for Dow Jones Newswires in Jersey City, N.J.

http://online.wsj.com/news/articles/SB121372818319181665