

The Importance of Safe Water

- More than 1 billion people do not have access to safe water
- Water-borne diarrheal diseases remain a leading cause of illness and death in the developing world
- About 2 million children die every year due to diarrheal disease
- International Network to Promote Household Water Treatment and Safe Storage established because of the public health need for safe drinking water
- P&G Health Sciences Institute has collaborated with the CDC since 1995 to develop safe drinking water systems that can be utilized at the household level



Children's Safe Drinking Water

P&G Live, Learn and Thrive Initiative.

P&G is working with a diverse group of partners to provide our PUR Purifier of Water technology in the developing world. Our goal is to reduce the sickness and death in children that results from drinking contaminated water. Our program includes not-for-profit social marketing and emergency relief components.



World Health Organization (WHO)'s International Network to Promote Household Water Treatment and Safe Storage

- There is now conclusive evidence that simple, acceptable, low-cost interventions at the household and community level are capable of dramatically improving the microbial quality of household stored water and reducing the attendant risks of diarrheal disease and death.
- It is now well documented that the provision of safe water alone will reduce diarrheal and other enteric diseases by 6 to 50%, even in the absence of improved sanitation or other hygiene measures.
- Overall, combined coagulation-flocculation and chlorine disinfection systems have shown considerable promise as microbiological purifiers of household water.

www.who.int/household_water

PUR Purifier of Water

Background Consumer Understanding

The PUR product was developed based on tests with thousands of consumers in developing countries. These consumers consistently say they want:

- Visible signals that water is cleaner
- At-home control
- Affordability

In-Home Water Treatment

The PUR product uses the same ingredients used in municipal water systems, but is reverse engineered to effectively be a mini water treatment plant in a sachet.

- Small sachet of powdered product provides precipitation, coagulation, and flocculation as well as residual chlorination
- Uses ingredients used in municipal treatment including ferric sulfate and calcium hypochlorite
- Provides visible signals that water is cleaner
- Provides superiority to chlorine alone in performance in turbid waters and reduction of parasites, pesticides, and heavy metals
- Stable and light-weight sachet provides for easy distribution for social markets and for providing emergency water

PUR Water Purification Process

The process to purify drinking water involves simple implements that consumers have in their homes.

- Add 1 sachet to 10 liters (or 2.5 gallons) of water and stir to begin process of precipitation and coagulation
- Stir water for 5 minutes until clear
- Filter water through a clean cotton cloth and dispose of separated floc in latrine
- Let clear water stand for 20 minutes to allow for complete disinfection
- Store in a suitable container to prevent recontamination

P&G

In association with

The U.S. Centers for Disease Control and Prevention (CDC)

International Council of Nurses



Source Water



Floc Formation after PUR Addition



Floc Formation after Complete Stirring



Decanting the Water Through a Clean Cotton Cloth Filter



Clean Water Ready for Storage and Use

Results of PUR Testing

Laboratory and Field Testing of PUR

Effective in Removing Bacteria

Bacteria	Initial (org/liter)	Post-Treatment
<i>E. coli</i>	2.0 x 10 ⁸	ND
10 common fecal bacteria	9.2 x 10 ⁹	ND
<i>Salmonella typhi</i>	1.6 x 10 ⁸	ND
<i>Vibrio cholerae</i>	1.2 x 10 ⁸	ND
<i>Shigella sonnei</i>	2.2 x 10 ⁸	ND
<i>Klebsiella terrigena</i>	2.8 x 10 ⁸	ND
<i>Campylobacter jejuni</i>	2.0 x 10 ⁸	ND

ND = None Detected

Effective in Removing Viruses

Virus	Initial Viral Count/ml (log 10)	Mean Log Reduction
Poliovirus	7.1	>5.0
Rotavirus	7.9	>5.0

Effective in Removing Cysts

Cyst	Mean Initial (org/liter)	Mean Log Reduction
<i>Cryptosporidium parvum</i>	1.76 x 10 ⁶	4.0
<i>Giardia lamblia</i>	1.84 x 10 ⁶	3.6

Reduction of Heavy Metals

Heavy Metal	Initial (ppb)	Post-Treatment (ppb)
Arsenic	229	1.2*
Chromium (III)	1300	3.1*
Lead	270	<10*

* Below WHO Guideline

Removes Organics and Some Pesticides

Test Material	Initial	Post-Treatment
Humic acid (ppm)	24-30	<1
DDT (ppb)	6	0.34

WHO Guideline for DDT = 2 ppb

Effective* in a Wide Variety of Field Samples

Country	Initial NTU	Treated NTU
Guatemala	0 - 501	0.0 - 2.6
Kenya	0.7 - 1850	0.4 - 3.2
Morocco	0 - 244	0.0 - 1.1
Philippines	0 - 550	0.0 - 1.2
Bangladesh	10 - 35	0.0 - 1.1
South Africa	<0.2 - 54	0.2 - 0.4

* Effective microbiologically as well as improving clarity

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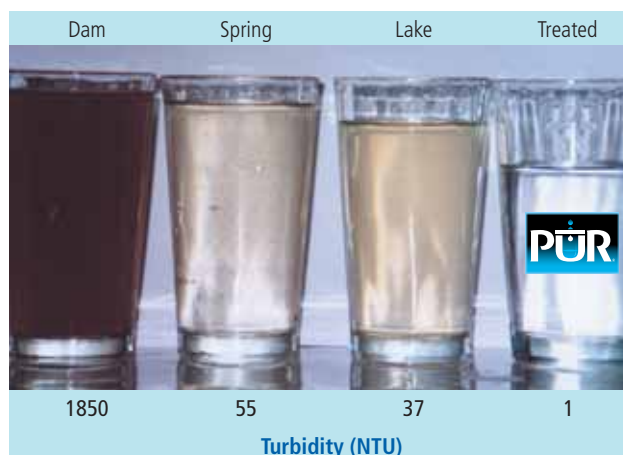
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Health Intervention Trials

The CDC and Johns Hopkins University have conducted 5 clinical trials of PUR and proven that it significantly reduces diarrheal illness in children and the total population.

Location/Setting	Study Design	Diarrhea Reduction
Rural Guatemala	2982 people 52 weeks	24-29% reduction
Rural Guatemala	3401 people 13 weeks	40-72% reduction
Rural Kenya – turbid water	6615 people 20 weeks	17-42% reduction
Pakistan – urban setting	12090 people 39 weeks	59-64% reduction
Liberia – refugee camp	2191 people 12 weeks	87-95% reduction

Kenyan Drinking Water Samples



Summary of Program Status

- Safe Drinking Water Alliance with US Agency for International Development (USAID), P&G, Population Services International (PSI), Johns Hopkins University, and CARE has funded introductions of PUR into Haiti and Pakistan and emergency relief work in Ethiopia
- Alliance with UK Department for International Development, P&G Health Sciences Institute, and PSI has funded national expansion and work with women's groups in Haiti
- Alliance with International Council of Nurses and PSI providing PUR in Uganda
- Plan to expand beyond current social markets of Haiti, Uganda, and Pakistan at about 2 countries per year
- Monitoring of emergency relief efforts have shown that with a little education to demonstrate proper use, PUR is practical, well-accepted, and reduces diarrheal illness
- Incorporated successfully into programs to help people live positively with HIV/AIDS
- More than 100 million liters of safe drinking water have been provided to people in need

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