

# LifeStraw

## Evidence Dossier

For LifeStraw **Family 1.0** and LifeStraw **Mission**

# Contents

---

01

## Laboratory Studies & Certifications .....3

London School of Hygiene and Tropical Medicine & University of Arizona: Evaluation of Microbiological Efficacy (EPA standards) and Longevity.....	3
University of Arizona: Evaluation for Compliance with WHO Guidelines.....	4
Intertek Vietnam: Quality Inspection for compliance with EPA guidelines.....	4
University of Arizona: Evaluation for Rotavirus Reduction.....	5
Para Membranes: Confirmation of 20nm Membrane Pore Size.....	5
Vestergaard Certification: LifeStraw Family® Durability Testing.....	6
List of Laboratory Assessments Completed in Various Countries.....	7

02

## Published Field Studies.....8

Walson et. al. (2013). Evaluation of impact of long-lasting insecticide-treated bed nets and point-of-use water filters on HIV-1 disease progression in Kenya.....	8
Kern et al. (2013). Provision of bednets and water filters to delay HIV-1 progression: cost-effectiveness analysis of a Kenyan multisite study.....	9
Peletz, et. al. (2012). Assessing Water Filtration and Safe Storage in Households with Young Children of HIV- Positive Mothers: A Randomized, Controlled Trial in Zambia.....	10
Peletz, et. al. (2013). Follow-Up Study to Assess the Use and Performance of Household Filters in Zambia .....	11
Kahn et al. (2012). Integrated HIV Testing, Malaria, and Diarrhea Prevention Campaign in Kenya: Modeled Health Impact and Cost-Effectiveness.....	11
De Ver Dye et al. (2011). A Qualitative Assessment of Participation in a Rapid Scale-Up, Diagonally-Integrated MDG-Related Disease Prevention Campaign in Rural Kenya.....	12
Boisson et al. (2010). Field assessment of a novel household-based water filtration device: a randomised placebo-controlled trial in the Democratic Republic of Congo.....	12

<b>03</b>	<b>Field Reports from Implementers.....</b>	<b>13</b>
	World Vision Mexico: Report on LifeStraw® Family Use and Acceptability in San Luis Potosí, 2012.....	13
	National Institute of Health Research: Evaluation of the efficacy of the LifeStraw® Family instant microbiological water purifier in water purification in Zimbabwe, 2012.....	14
	World Vision Mexico: Report on LifeStraw® Family Use and Acceptability in Oaxaca, 2011...	15
	Institute of Technology of Cambodia: Testing the efficiency of LifeStraw® Family in purifying drinking water, 2011.....	15
	ACTED: Report on LifeStraw® Family Distribution in Haiti, 2010.....	16
	Iwana Green Group: LifeStraw® Family acceptability study, Colombia, 2010.....	16
	SANRU, USAID Project AXxes: Usage of LifeStraw Family in the DRC: Results from Pilot Study, 2007.....	17
<b>04</b>	<b>Summary of Evidence by Category.....</b>	<b>18</b>
	Health Impact.....	18
	User Acceptability.....	19
	Cost Effectiveness.....	21
	Water Quality in the Field.....	22
<b>05</b>	<b>Contacts.....</b>	<b>23</b>



# Laboratory Studies & Certifications

## London School of Hygiene and Tropical Medicine & University of Arizona: Evaluation of Microbiological Efficacy (EPA standards) and Longevity

**Study:** Laboratory assessment of a gravity-fed ultrafiltration water treatment device designed for household use in low income settings, 2009. (Published American Journal of Tropical Medicine. 80:819-823).

**Institutions:** London School of Hygiene and Tropical Medicine: Department of Infectious and Tropical Diseases; University of Arizona: Department of Soil, Water and Environmental Science; Vestergaard Frandsen S.A.

**Authors:** Clasen, T., J. Naranjo, D. Frauchiger and C. Gerba.

### Outcome:

- **Microbiological:** The average log 10 reductions exceeded 6 logs (99.9999%) of the test organism for bacteria, 4 (99.99%) of the test organism for virus, and 3 logs (99.9%) of the test organism for protozoan cysts, meeting compliance with EPA standards.
- **Flow Rate:** Average flow rate of 8.8 L/hr over the life of the LifeStraw Family filter
- **Longevity:** All LifeStraw Family units continued to produce at least 100 mL/min through the 18,000 liter design life. There was no evidence of impaired microbiological performance through 20,000 liters of operation.

Micro-organism	LifeStraw® efficacy*	EPA Requirements
<i>Escherichia coli</i> (bacteria)	>7.3	6.0
Cryptosporidium oocysts (Protozoa)	>3.9	3.0

\*Note: results in Log reduction values (LRV)

## University of Arizona: Evaluation for Compliance with WHO Guidelines

**Study:** Assessment of the LifeStraw Family Unit using the World Health Organization Guidelines for “Evaluating Household Water Treatment Options: Health-based Targets and Performance Specifications,” 2011.

**Institution:** University of Arizona, Department of Soil, Water and Environmental Science

**Authors:** Naranjo, J. and Gerba, C.P.

**Outcome:** The results obtained from microbial challenges indicated that the LifeStraw Family units exceeded the requirements for a “Highly Protective” water treatment device as defined by the World Health Organization

Minimum Log <sub>10</sub> Removal of Indicated Organism			
<i>E. Coli</i> (Bacteria)	<i>MS-2</i> (Virus)	<i>Rotavirus SA-11</i> (Virus)	<i>Cryptosporidium parvum</i> (Protozoa)
>6.40	>5.26	>5.10	>4.10

## Intertek Vietnam: Quality Inspection for compliance with EPA guidelines

**Study:** LifeStraw® Family Quality Inspection, 2010

**Institution:** Intertek Vietnam, 2010

**Outcome:** LifeStraw® Family successfully passed the Intertek quality inspection and complies with the USEPA 1987 guide standard and protocol for testing microbiological water purifiers. Met standards of >99.9999% or LOG 6 removal of bacteria, >99.99% or LOG 4 removal of viruses and >99.9% or LOG 3 removal of protozoan parasites.

LifeStraw® Family also complies with the USEPA maximum residual disinfectant for chlorine (< 4 mg/L), with the NSF/ANSI 53 maximum permissible product water concentration for turbidity (< 0.5 NTU) and with Vestergaard Frandsen requirements flow-rate (> 12L/h).

## University of Arizona: Evaluation for Rotavirus Reduction

**Study:** Rotavirus Reduction by LifeStraw Family Filters, 2013

**Institution:** University of Arizona, Department of Soil, Water and Environmental Science

**Authors:** Jaime Naranjo, B. S. and Charles P. Gerba, Ph.D.

**Outcome:** The results obtained from the microbial challenge indicated that the LifeStraw Family 1.0 units exceeded the requirements for a “Highly Protective” water treatment device as for rotavirus as defined by the World Health Organization guidelines for testing of microbiological water purifiers (WHO, 2011), exceeding Log 6 reduction for rotavirus.

LifeStraw® Family 1.0 Rotavirus Reduction Results Are Given as Plaque Forming Unity per Liter				
Unit Code	Influent	Effluent	Log Reduction	Percent Reduction
5 ANA LSF	3.16e8	<1.11E2	>6.46	>99.99996
4 ANA LSF	3.16e8	<1.11E2	>6.46	>99.99996
3 ANA LSF	3.16e8	<1.11E2	>6.46	>99.99996
2 ANA LSF	3.16e8	<1.11E2	>6.46	>99.99996
1 ANA LSF	3.16e8	<1.11E2	>6.46	>99.99996

## Para Membranes: Confirmation of 20nm Membrane Pore Size

**Study:** Confirmation of absolute membrane size through microbiological testing and scanning electron microscopy, 2013.

**Institution:** Para Membranes Co. Ltd., South Korea

**Outcome:** Testing achieved log 7.28 reduction in bacteria and log 5.95 reduction in virus. Additional scanning electron microscopy further confirmed the fact that the absolute pore size of the membranes is 20 nanometers.



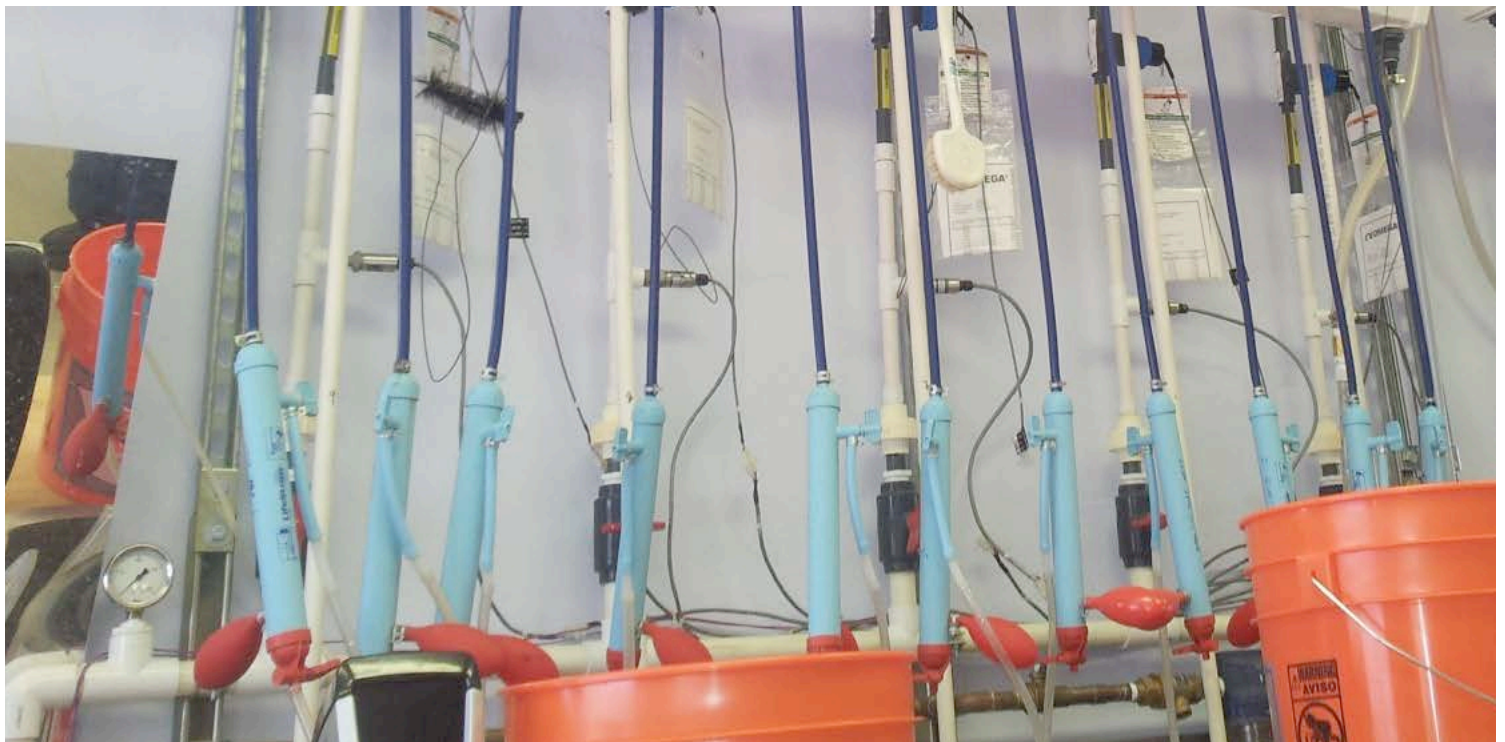
## Vestergaard Certification: LifeStraw Family® Durability Testing

**Study:** 40 units of LifeStraw® Family 1.0 exposed to conditions representative of a lifetime of use to test for durability, 2010.

**Institution:** Vestergaard Frandsen, Lausanne, Switzerland

### Outcome:

Test #	Test description	Result
1	Simulation of transport conditions: vibrations combined with high or low temperatures	PASS
2	Simulation of a drop during transport: drop of a LSF box from 2.5m high on a hard floor at low and high temperatures	PASS
3	Aging/weathering of the product under elevated temperature (50°C) and elevated humidity (30, 50 and 100% RH) during 3 weeks	PASS
4	Simulation of a drop of the LifeStraw® Family at home: drop of the product when attached to the wall, 1.8m	PASS
5	Simulation of static load on the ultrafiltration cartridge: 15kg	PASS
6	Endurance of moving parts: blue tap (50,000 opening/closing), red tap (1,100 opening/closing), red plastic bulb (3,300 squeezes)	PASS
7	Overpressurization of the ultrafiltration cartridge (1 bar water pressure)	PASS
8	Antimicrobial efficacy, final control: >LOG6 reduction for bacteria, >LOG 4 for virus, >LOG 3 for protozoan parasites	PASS
<b>OVERALL</b>		<b>PASS</b>



## List of Laboratory Assessments Completed in Various Countries

Country	Institution	Year
<b>Angola</b>	Ministry of Health	<b>2011</b>
<b>Bhutan</b>	Public Health Laboratory	<b>2012</b>
<b>Botswana</b>	Water Utilities Corporation	<b>2011</b>
<b>Brazil</b>	Pro-Lab	<b>2008</b>
<b>Burkina Faso</b>	Université de Ouagadougou	<b>2011</b>
<b>Colombia</b>	Universidad de Antioquia Instituto Departamental de Salud de Narino	<b>2010</b>
<b>Costa Rica</b>	Universidad de Costa Rica	<b>2011</b>
<b>Ethiopia</b>	Ministry of water resources lab	<b>2008</b>
<b>Ghana</b>	Water research institute	<b>2008</b>
<b>Haiti</b>	Laboratoire Vétérinaire et de Contrôle de Qualité des Aliments de Tamarinier	<b>2010</b>
<b>India</b>	Dehli test house Public Health Eng. Dpt. Water testing Lab SPECTRO Analytical Labs Ltd	<b>2008</b> <b>2011</b> <b>2011</b>
<b>Kenya</b>	Kenya Bureau of Standards	<b>2008</b>
<b>Madagascar</b>	WaterAid lab	<b>2008</b>
<b>Mozambique</b>	Laboratorio Nacional de Higiene de Alimentos e Aguas – Misau	<b>2010</b>
<b>Nigeria</b>	Lagos reference laboratory	<b>2011</b>
<b>Philippines</b>	Qualibet	<b>2009</b>
<b>Rwanda</b>	Rwanda Bureau of Standards	<b>2008 &amp; 2011</b>
<b>South Africa</b>	Umgeni Water Amanzi; National Health Lab. Service	<b>2008</b>
<b>South Sudan</b>	SPLA Medical Crops IGHQs Diagnostic Center	<b>2010</b>
<b>Sudan</b>	Sudanese Standards and Metrology Organization	<b>2011</b>
<b>Zambia</b>	Environmental engineering lab; Food and Drugs Control Laboratory, Ministry of Health, Zambia Bureau of Standards	<b>2008 &amp;</b> <b>2010</b>
<b>Zimbabwe</b>	National Institute of Health Research	<b>2011</b>

\*\*Copies of country-specific reports are available upon request by emailing [info@lifestraw.com](mailto:info@lifestraw.com)





## Published Field Studies

**Walson et. al. (2013). Evaluation of impact of long-lasting insecticide-treated bed nets and point-of-use water filters on HIV-1 disease progression in Kenya**

**Citation:** Walson J, Sangare L, Singa B, Naulikha J, Piper B, Yuhas K, et al. Evaluation of impact of long-lasting insecticide-treated bed nets and point-of-use water filters on HIV-1 disease progression in Kenya. *AIDS*. 2013 Jun; 27(9): p. 1493-501.

**Study Overview:** The study sought to determine whether the use of long-lasting insecticide-treated bed nets and simple point-of-use water filters (LifeStraw® Family 1.0) can delay HIV-1 disease progression at two HIV care sites in Kenya. Participants were HIV-1 infected adults not yet meeting criteria for antiretroviral therapy. One group received the standard of care, while the other received long lasting insecticide-treated bed nets and water filters. Individuals were followed for up to 24 months.

### **Outcome:**

- **Health Impact (Diarrhea):** Participants in the intervention group has a 35% reduced risk of self-reported diarrhea over the previous 3 months (95% CI: 0.45-0.93).
- **Health Impact (HIV):** 27% risk reduction in HIV disease progression (95% CI: 0.57-0.95) and a 24% decrease in CD4 decline among HIV-1 infected adults already receiving cotrimoxazole and multivitamins.
- **User Acceptability:** 93% of participants in the intervention group reported using the filter at follow-up visits.

## Kern et al. (2013). Provision of bednets and water filters to delay HIV-1 progression: cost-effectiveness analysis of a Kenyan multisite study.

**Citation:** Kern E, Verguet S, Yuhas K, Odhiambo FH, Kahn JG, Walson J. Provision of bednets and water filters to delay HIV-1 progression: cost effectiveness analysis of a Kenyan multisite study. Trop Med Int Health. 2013 Aug; 18(8): p. 916-24.

**Study Overview:** The study estimates the effectiveness, costs and cost-effectiveness of providing long-lasting insecticide-treated nets (LLINs) and point-of-use water filters (LifeStraw® Family 1.0) to antiretroviral therapy (ART) naïve HIV-infected adults and their family members, in the context of a multisite study in Kenya of 589 HIV-positive adults followed on average for 1.7 years. The study used an epidemiologic-cost model; epidemiologic inputs were derived from the Kenya multisite study data, local epidemiological data and from the published literature. Model cost inputs were derived from published literature specific to Kenya. Uncertainty in the model estimates was assessed through univariate and multivariate sensitivity analyses.

### Outcome:

- **Health Impact (Diarrheal Cases Averted):** The model estimates that over the course of 1.7 years 2,898 cases of diarrhea were averted among the 361 study participants in the intervention.
- **Cost Effectiveness:** Over 1.7 years an estimated US \$9,834 in diarrhoea treatment costs were averted due to the provision of LifeStraw® Family, and a total of \$US 24,395 in costs of HIV care and treatment were averted. Overall, (on a 2 year scale) the intervention was expected to produce a net cost savings of \$32,638 and have a Cost Effectiveness Ratio of US \$84/DALY.

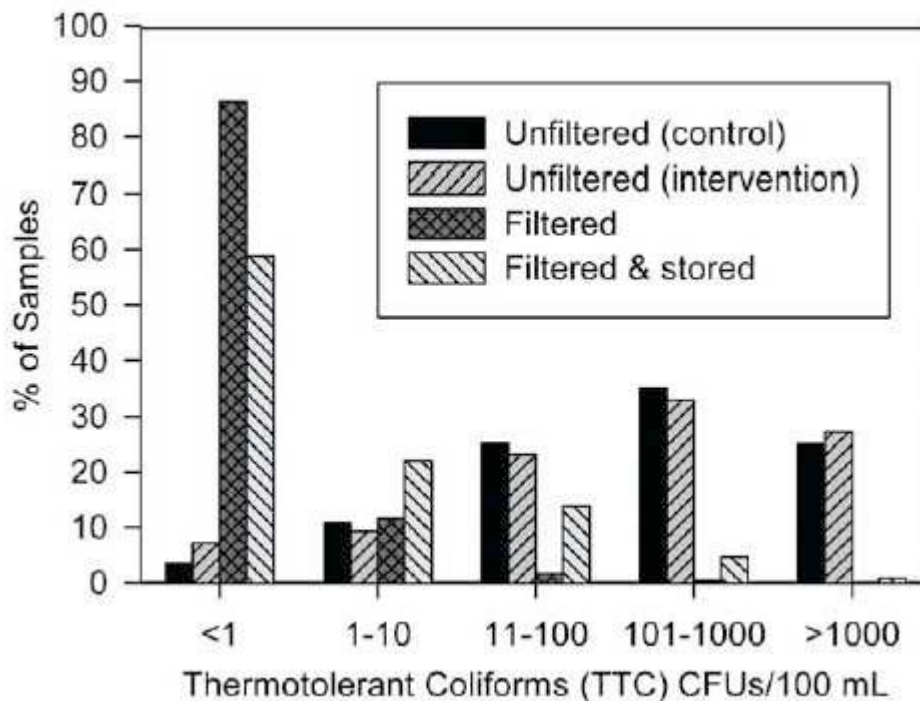
**Peletz, et. al. (2012). Assessing Water Filtration and Safe Storage in Households with Young Children of HIV- Positive Mothers: A Randomized, Controlled Trial in Zambia**

**Citation:** Peletz R, Simunyama M, Sarenje K, Baisley K, Filteau S, Kelly P, et al. Assessing water filtration and safe storage in households with young children of HIV-positive mothers: a randomized, controlled trial in Zambia. PloS one. 2012; 7(10): e46548.

**Study Overview:** 12-month randomized, controlled field trial in Zambia among 120 households with children ,2 years (100 with HIV-positive mothers and 20 with HIV-negative mothers to reduce stigma of participation) to assess a high-performance water filter (LifeStraw® Family 1.0) and jerry cans for safe storage. Households were followed up monthly to assess use, drinking water quality and reported diarrhea (7-day recall) among children 2 years and all members of the household.

**Outcome:**

- **Health Impact:** The intervention was associated with reductions in the longitudinal prevalence of reported diarrhea of 53% among children, 2 years (LPR = 0.47, 95% CI: 0.30–0.73, p = 0.001) and 54% among all household members (LPR = 0.46, 95% CI: 0.30–0.70,p,0.001)
- **User Acceptability:** Filter use was high: 96% of household visits met the criteria for users
- **Water quality:** The quality of water stored in intervention households was significantly better than in control households (3 vs. 181 TTC/100 mL, respectively, p: 0.001).



## Peletz, et. al. (2013). Follow-Up Study to Assess the Use and Performance of Household Filters in Zambia

**Citation:** Peletz R, Simuyandi M, Simunyama M, Sarenje K, Kelly P, Clasen T. Follow-Up Study to Assess the Use and Performance of Household Filters in Zambia. *Am J Trop Med Hyg.* 2013; 89(6): p. 1190-1194.

**Study Overview:** Follow-up study to assess use and performance of LifeStraw® Family 1.0 filters that had been distributed one year ago upon conclusion of a randomized controlled trial. 93 of 101 households enrolled in study. Unannounced visits conducted in all participating households. There had not been any prior contact with those households for a period of one year.

### Outcome:

- **User Acceptability:** Filter use was high: 90% of participating households met the criteria for current users and 75% of participating households had stored water with lower levels of fecal contamination than source water. 96% of households answered “nothing” when they were asked what they liked least about the LifeStraw. When asked what they liked most about the LifeStraw filter, 87% said it provides safe water, and 77% said it also improved water taste.
- **Water quality:** Filters continued to perform well, removing an average of 99.0% of fecal indicator bacteria.

## Kahn et al. (2012). Integrated HIV Testing, Malaria, and Diarrhea Prevention Campaign in Kenya: Modeled Health Impact and Cost-Effectiveness.

**Citation:** Kahn JG, Muraguri N, Harris B, Lugada E, Clasen T, Grabowski M, et al. Integrated HIV Testing, Malaria and Diarrhea Prevention Campaign in Kenya: Modeled Health Impact and Cost-Effectiveness. *PloS one.* 2010 Feb; 7(2): e31316.

**Study Overview:** A 2008 community integrated prevention campaign in Western Province, Kenya, reached 47,000 individuals over 7 days, providing HIV testing and counseling, water filters (LifeStraw® Family), insecticide-treated bed nets, condoms, and for HIV-infected individuals cotrimoxazole prophylaxis and referral for ongoing care. The potential cost-effectiveness of a scaled-up integrated prevention campaign was modeled.

**Outcome:** The largest impact on both cost and health outcomes was from diarrhoeal cases and deaths averted as a result of the inclusion of the LifeStraw® Family technology in the CarePack.

- **Health Impact: (Disease Averted):** The model estimates that the Integrated Prevention Campaign averts 16.3 deaths: 4.31 from malaria, 6.81 from diarrhea, and 5.22 from HIV. There are an additional 1,304 averted episodes of malaria and 6,780 of diarrhea.
- **Cost Effectiveness:** An estimated \$48,125 USD per 1,000 recipients was averted in medical treatment costs as a result of the provision of the water filter.

## De Ver Dye et al. (2011). A Qualitative Assessment of Participation in a Rapid Scale-Up, Diagonally-Integrated MDG-Related Disease Prevention Campaign in Rural Kenya

**Citation:** De Ver Dye T, Apondi R, Lugada E, Kahn JG, Sandiford-Day MA, DasBanerjee T. A Qualitative Assessment of Beliefs, Attitudes, and Behaviors Related to Diarrhea and Water Filtration in Rural Kenya. American Journal of Public Health. 2011 Aug; 101(8): p. 1515-20.

**Study Overview:** The study examined motivational and experiential dimensions of participation in a novel, rapid, “diagonal” Integrated Prevention Campaign (IPC) in rural Kenya that provided prevention goods (including a LifeStraw® Family 1.0 water purifier) as part of a Carepack, to motivate individuals to undergo voluntary HIV counseling. The Carepack and complementary services were provided to 47,000 people within one week, aimed at rapidly moving the region toward MDG achievement. Qualitative in-depth interviews (IDI) were conducted with 34 people randomly selected from IPC attendees consenting to participate.

### Outcome:

- **User Acceptability:** 71% of study participants noted that the availability of the LifeStraw® Family water filters motivated their participation and satisfaction in the program. “People appreciated the opportunity to receive real benefit for diseases they experienced as important in their communities.”

## Boisson et al. (2010). Field assessment of a novel household-based water filtration device: a randomised placebo-controlled trial in the Democratic Republic of Congo.

**Citation:** Boisson S, Kiyombo M, Sthreshley L, Saturnin T, Makambo J, Clasen T. Field Assessment of a Novel Household-Based Water Filtration Device: A Randomised, Placebo-Controlled Trial in the Democratic Republic of Congo. PloS one. 2010 Sept; 5(9): e12613.

**Study Design:** 12-month RCT among 240 households (1144 persons) in remote, rural Congo. Goal was to assess the field performance, use and effectiveness of a novel filtration device (LifeStraw® Family 1.0) in preventing diarrhea. Filters and placebos were monitored for longevity and for microbiological performance by comparing thermotolerant coliform (TTC) levels in influent and effluent water samples

### Outcome:

- **Health Impact:** Diarrhea in intervention group fell from 10.6% to 2.66% (75% reduction). However, there was no statistically significant difference between intervention and control. Placebo thought to have had a protective effect.
- **User Acceptability:** Upon follow-up after 14 months, 76% met the study’s definition of current users of the LifeStraw® Family.
- **Water quality:** While 75% of 580 source water samples had contamination levels >1000 TTC/100ml, 64% of filtered samples taken at the household level were free of TTC and 27% had levels between 1-10 TTC/100ml.





## Field Reports from Implementers

### World Vision Mexico: Report on LifeStraw® Family Use and Acceptability in San Luis Potosí, 2012

**Partner:** World Vision Mexico

**Study Overview:** Follow-up on 399 families that received LifeStraw® Family filters during a humanitarian emergency in which flood waters caused displacement and poor sanitation in 7 different locations of San Luis Potosí state. The follow-up study occurred 4 months after distribution and observed whether filters were properly installed and also gathered information on reported usage.

#### **Outcome:**

- **User Acceptability:** Overall, 99% of the families in the 7 locations were using the LifeStraw® Family correctly and all families had installed them in their homes. Families reported it was greatly beneficial to younger children, that the water tasted good, appeared much cleaner, and that they had wood savings from not having to boil water.

## National Institute of Health Research: Evaluation of the efficacy of the LifeStraw® Family instant microbiological water purifier in water purification in Zimbabwe, 2012

**Study Overview:** Thirty households in selected villages were each issued a LifeStraw Water purifier, trained in purifier use and maintenance and basic water handling education. Interviews, observations and water samplings were conducted by enumerators from the research team over a 12 month period. Water quality analyses were carried out by laboratory technician and an Environmental Health technician. A survey was administered to determine the perceptions of the LifeStraw Family recipients with regard the quality of the water from the purifier, ease of operation and maintenance and general acceptability of the technology.

**Implementer:** National Institute of Health Research Zimbabwe, 2012

### Outcome:

- **Water Quality:** Water samples from 25 purifiers in regular use showed reductions in E. coli counts in all cases. The values of E. coli counts for purified water samples indicates that 23 of the water samples achieved the Standard Association of Zimbabwe guidelines (SAZ, 1997) and 18 met the WHO guideline value of 0cfu/100ml (WHO, 2011).
- **High turbidity removal:** All 25 purifiers showed reductions in turbidity with a mean reduction of over 98%. All 25 (100%) filtered water samples were within the WHO guideline limits of <5NTU with on average 23 (92%) samples recording turbidity reductions to ONTU.
- **User Acceptability:** Use and acceptability: Recipients reported high levels of user satisfaction with regard to: ease of operation and maintenance, improved appearance, taste and smell of the filtered water, that the LifeStraws provided a sufficient amount of water for the family, and that there were perceived health benefits. The purifiers were well maintained and showed a significant level of durability with 80% of them performing satisfactorily more than 10 months after first use. For the 20% of the units which did not perform well, the major problem was that plastic parts had been damaged by rats.



## World Vision Mexico: Report on LifeStraw® Family Use and Acceptability in Oaxaca, 2011

**Partner:** World Vision Mexico

**Study Overview:** Follow-up on 183 families after LifeStraw® Family distribution. Observed whether filters were properly installed and also gathered information on reported usage.

### **Outcome:**

- **User Acceptability:** Overall 98% of the families are using the LifeStraw® Family correctly and have integrated it in their daily household activities.

## Institute of Technology of Cambodia: Testing the efficiency of LifeStraw® Family in purifying drinking water, 2011

**Study Overview:** Twenty-two LifeStraw® Family 1.0 filters were distributed to households in Prusac and Kandal provinces in Cambodia. An additional two units were laboratory tested. Water samples from the filters in the field were collected weekly for a period of three months and analyzed for turbidity, microbial content and pH. Filters were also tested for flow rate.

**Partner:** Institute of Technology of Cambodia

### **Outcome:**

- **User Acceptability:** All 22 households reported high user acceptability and regular usage. Households reported a willingness to pay for the filters of between \$5 and \$10 USD.
- **Water Quality:** The LifeStraw® Family filters showed a high efficacy (99.99%) in removing microorganisms. The filter produces enough water for a household consumption with a flow-rate of about 200mL/min. Results also showed effective removal of turbidity.

## ACTED: Report on LifeStraw® Family Distribution in Haiti, 2010

**Study Overview:** Report on LifeStraw® Family distribution in Haiti, 2010

**Implementer:** ACTED (Agency for Technical Cooperation and Development)

**Study design:** Follow-up on 70 families after LifeStraw® Family to assess user acceptability and efficacy of education, several weeks after distribution

### Outcome:

- **User Acceptability:** 100% of the families reported that filter use is not a constraint and that LSF is a solution to the drinking water issues the camps population is facing; 77% could demonstrate a perfect use of LSF; 22% did only 1 mistake during the demonstration.

## Iwana Green Group: LifeStraw® Family acceptability study, Colombia, 2010

**Study Overview:** Follow-up on 10 households after distribution of LifeStraw Family to assess user acceptability

**Implementer:** Iwana Green Group

### Outcome:

- **User Acceptability:** 90% of participants have declared to have recently used the LifeStraw® Family filter. 70% have used it whether the same day or the day before, 20% have used it the week before. None of the LifeStraw® Family components was missing or damaged. 100% of participants found the filter easy to use and liked the water taste and that the purified water appeared very clean. All respondents have appreciated that the LifeStraw® Family filter purifies the water and improves the family health (less diarrhea cases).

## SANRU, USAID Project AXxes: Usage of LifeStraw Family in the DRC: Results from Pilot Study, 2007

**Study Overview:** One month pilot program to investigate the functioning and acceptability of LifeStraw® Family by its intended target group in the Democratic Republic of Congo, 2007. The study was conducted among ten families, half of which were residing in urban areas, and half in rural areas. All were amongst the lowest economic quartile.

**Implementer:** SANRU- ECC/IMA (USAID-funded Project AXxes)

### **Outcome:**

- **User Acceptability:** Concluded that if the product has been explained properly once, the users understand and use the product correctly. The LifeStraw was well accepted by all the families in the study and was being extensively used after one month. The products showed no malfunction or damage after a month's usage, and showed impressive flow rate of one litre in less than five minutes. The participants found them easy to use and maintain.



## Summary of Evidence by Category

### Health Impact

Reference	Country	Study	Results
<a href="#">Walson et al, 2013</a>	Kenya	24-month RCT of 589 HIV-pos participants; intervention group receiving LifeStraw® Family and LLIN.	<ul style="list-style-type: none"> <li>• 35% reduced risk of diarrhea in the intervention vs control groups</li> <li>• 27% reduced risk of HIV disease progression</li> <li>• 24% reduced risk in CD4 decline</li> </ul>
<a href="#">Kern et al, 2013</a>	Kenya	Modeling study based on intervention described in Walson, 2013, potential outcomes for 361 individuals in the intervention over 1.7 yrs	<ul style="list-style-type: none"> <li>• 2,898 cases of diarrhea averted</li> </ul>
<a href="#">Peletz et al, 2012</a>	Zambia	12 month RCT of 120 Households with HIV-pos mothers and children under 2 in Zambia	<ul style="list-style-type: none"> <li>• 53% reduction in longitudinal diarrhea among children under 2</li> <li>• 54% reduction in diarrhea among all household members</li> </ul>
<a href="#">Kahn et al, 2012</a>	Kenya	CEA study based on modeling from a 2008 Integrated Prevention Campaign in Kenya where 47,000 individuals received VCT, LifeStraw® Family filters, LLINs and condoms. Benefits of diarrhea averted modeled over 1.3 – 2.7 years.	<p>Per 1,00 participants:</p> <ul style="list-style-type: none"> <li>• estimated 6.81 deaths averted from diarrhea</li> <li>• 6,780 episodes of diarrhea averted</li> <li>• 191 DALYs averted due to prevention of diarrhea</li> </ul>
<a href="#">Boisson et al, 2010</a>	DRC	12 month double-blinded RCT with placebo of 240 households receiving filters	<ul style="list-style-type: none"> <li>• Diarrhea in intervention group fell from 10.6% to 2.66% (75% reduction). However, no stat significant difference between intervention and control. Placebo thought to have had a protective effect.</li> </ul>

## User Acceptability

Reference	Country	Study	Results
<b>PUBLISHED STUDIES</b>			
<a href="#">Walson et al, 2013</a>	Kenya	24-month RCT of 589 HIV-pos participants; intervention group receiving LifeStraw® Family and LLIN.	<ul style="list-style-type: none"> <li>93% of participants in the intervention group reported using the filter at follow-up visits</li> </ul>
<a href="#">Peletz et al, 2012</a>	Zambia	12 month RCT of 120 Households with HIV-pos mothers and children under 2 in Zambia	<ul style="list-style-type: none"> <li>96% of households met study criteria for users</li> </ul>
<a href="#">Peletz et al, 2013</a>	Zambia	1 year follow-up of RCT to assess filter performance and user acceptability	<ul style="list-style-type: none"> <li>90% of households met criteria of current users</li> <li>75% of households had stored water with lower levels of fecal contamination than source water</li> </ul>
<a href="#">De Ver Dye et al, 2011</a>	Kenya	The study examined motivational and experiential dimensions of Integrated Prevention Campaign (IPC that provided prevention goods (including a LifeStraw® Family 1.0 water purifier) to motivate individuals to undergo voluntary HIV counseling	<ul style="list-style-type: none"> <li>71% of study participants noted that the availability of the LifeStraw® Family water filters motivated their participation and satisfaction in the program</li> </ul>
<a href="#">Boisson et al, 2010</a>	DRC	12 month double-blinded RCT with placebo of 240 households receiving filters	<ul style="list-style-type: none"> <li>76% of participants met study definitions of current users upon follow-up after 14 months</li> </ul>
<b>FIELD REPORTS FROM IMPLEMENTERS</b>			
<a href="#">World Vision, 2012</a>	Mexico	Follow-up on 399 families 4 mos after LifeStraw® Family distribution during a disaster. Observed whether filters were properly installed and correctly used.	<ul style="list-style-type: none"> <li>99% of the families were using the LifeStraw® Family correctly. Families reported health benefits, improved taste, smell and clarity.</li> </ul>
<a href="#">National Institute of Health, 2012</a>	Zimbabwe	12 month study of 30 households receiving LifeStraw® Family, water sample testing and user surveys administered.	<ul style="list-style-type: none"> <li>80% of filters with high performance after 10 months. High reported user acceptability.</li> </ul>
<a href="#">World Vision, 2011</a>	Oaxaca, Mexico	Follow-up on 183 families after LifeStraw® Family distribution. Observed whether filters were	<ul style="list-style-type: none"> <li>98% of the families are using the LifeStraw® Family correctly and</li> </ul>

		properly installed and also gathered information on reported usage.	have integrated it in their daily household activities.
<a href="#">Institute of Cambodia, 2011</a>	Cambodia	22 units field tested in Cambodia; follow-up with households after a period of 3 month	<ul style="list-style-type: none"> <li>All families reported high user acceptability and regular usage with a willingness to pay of between \$5 and \$10 USD</li> </ul>
<a href="#">ACTED, 2010</a>	Haiti	Follow-up on 70 families after LifeStraw® Family to assess user acceptability and efficacy of education, several weeks after distribution	<ul style="list-style-type: none"> <li>100% of the families reported that filter use is not a constraint and that LSF is a solution to the drinking water issues the camps population is facing;</li> <li>77% could demonstrate a perfect use of LSF</li> </ul>
<a href="#">Iwana Green Group, 2010</a>	Columbia	Follow-up on 10 households after distribution of LifeStraw Family to assess user acceptability	<ul style="list-style-type: none"> <li>90% of participants have declared to have recently used the LifeStraw® Family filter.</li> <li>70% have used it the same day or the day before</li> </ul>
<a href="#">SANRU (USAID AXes), 2007</a>	DRC	One month pilot program to investigate the functioning and acceptability of LifeStraw® Family among 10 families	<ul style="list-style-type: none"> <li>The LifeStraw was well accepted by all the families in the study and was being extensively used after one month</li> <li>Concluded that if the product has been explained properly once, the users understand and use the product correctly.</li> </ul>

## Cost Effectiveness

---

Reference	Country	Study	Results
<a href="#">Kern et al, 2013</a>	Kenya	Modeling study based on intervention described in Walson, 2013, potential outcomes for 361 individuals in the intervention over 1.7 yrs	<ul style="list-style-type: none"> <li>• An estimated US \$9,834 in diarrhoea treatment costs,</li> <li>• A total of \$US 24,395 in costs of HIV care and treatment were averted.</li> <li>• Overall, (on a 2 year scale) the intervention was expected to produce a net cost savings of \$32,638 and have a Cost Effectiveness Ratio of US \$84/DALY.</li> </ul>
<a href="#">Kahn et al, 2012</a>	Kenya	CEA study based on modeling from a 2008 Integrated Prevention Campaign in Kenya where 47,000 individuals received VCT, LifeStraw® Family filters, LLINs and condoms. Benefits of diarrhea averted modeled over 1.3 – 2.7 years.	<ul style="list-style-type: none"> <li>• An estimated \$48,125 USD per 1,000 recipients was averted in medical treatment costs as a result of the provision of the water filter.</li> </ul>



## Water Quality in the Field

Reference	Country	Study	Results
<a href="#">Peletz et al, 2012</a>	Zambia	12 month RCT of 120 Households with HIV-pos mothers and children under 2 in Zambia	<ul style="list-style-type: none"> <li>The quality of water stored in intervention households was significantly better than in control households (3 vs. 181 TTC/100 mL, respectively, p: 0.001).</li> </ul>
<a href="#">Peletz et al, 2013</a>	Zambia	1 year follow-up of RCT to assess filter performance and user acceptability	<ul style="list-style-type: none"> <li>75% of households had stored water with lower levels of fecal contamination than source water</li> <li>Filters removed an average of 99% of fecal indicator bacteria</li> </ul>
<a href="#">National Institute of Health, 2012</a>	Zimbabwe	12 month study of 30 households receiving LifeStraw® Family, water sample testing and user surveys administered.	<ul style="list-style-type: none"> <li>18 of 25 water samples meeting WHO standard of 0 TTC/100ml</li> <li>100% of samples meeting WHO threshold of below 5 NTU</li> </ul>
<a href="#">Institute of Cambodia, 2011</a>	Cambodia	22 units field tested in Cambodia; weekly water samples taken for a period of three months and analyzed for microbiological content in the lab.	<ul style="list-style-type: none"> <li>High efficacy (99.99%) in removing microorganisms; effective removal of turbidity</li> </ul>
<a href="#">Boisson et al, 2010</a>	DRC	12 month double-blinded RCT with placebo of 240 households receiving filters	<ul style="list-style-type: none"> <li>While 75% of 580 source water samples had contamination levels &gt;1000 TTC/100ml, 64% of filtered samples taken at the household level were free of TTC and 27% had levels between 1-10 TTC/100ml.</li> </ul>

## CONTACTS

Email Inquiries: [info@lifestraw.com](mailto:info@lifestraw.com)

Website: [www.vestergaard.com](http://www.vestergaard.com)

Regional Offices:

### AFRICA

Vestergaard Frandsen East Africa Ltd.

ABC Towers, 5th Floor

Walyaki Way

P.O. Box 66889 – 00800

Nairobi.

Tel:- +254 20 4444758/9

Fax:- +254 20 4444526

### AMERICAS

Vestergaard Frandsen Inc.

1020 19th St. NW

Suite 895

Washington D.C., 20036

USA

Tel: +1 571 527 2180

### ASIA

Vestergaard Frandsen (India) Pvt. Ltd

309, Rectangle One,

D-4, Saket (Behind Sheraton Hotel)

New Delhi – 110017

Tel: 011-40553666

### EUROPE

Vestergaard Frandsen (Headquarters)

Chemin de Messidor 5 - 7,

CH - 1006 Lausanne,

Switzerland

Tel: +41 (0) 21 310 7333

Fax: +41 (0) 21 310 7330

**LifeStraw<sup>®</sup>** 

Family 1.0 | by VESTERGAARD



**VESTERGAARD®**   
IMPACTING PEOPLE