Point-of-Collection Chlorine Dispenser

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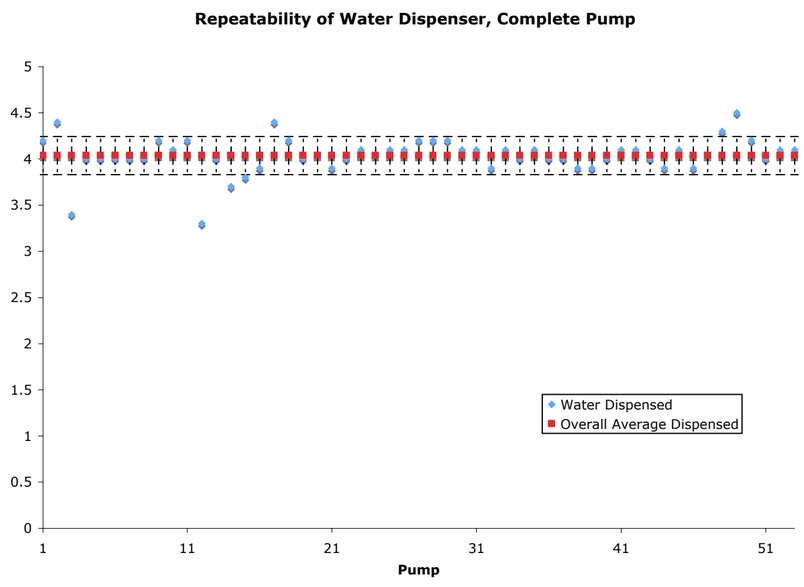
Our objective is to design a chlorine dispenser that will allow community members in rural villages in Kenya to treat individual water containers at the water source. The device should be easy to use, sturdy, inexpensive, safe, and it should accommodate various container sizes. The design should ideally be tamper proof and have the flexibility to be used in other locations.

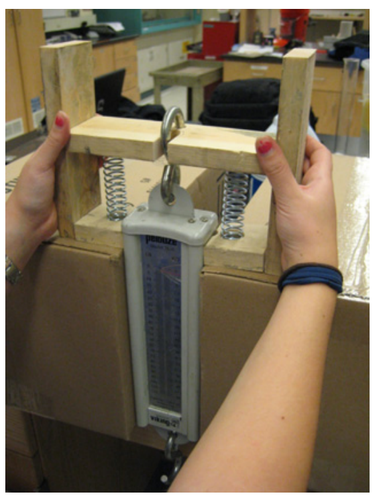
Initial Experimental Results

Pump dispenser repeatability



Chlorinated water taste test

- Water dispensed from complete pump: 4.04 ± .21 mL
- Water dispensed from partial pump [down to stop]: 2.51 ± .36 mL



Spring-based variable dosing proof-of-concept

User interface test

Pugh Charts

Variable Height

	Tube	Telescoping	Slider (pin-hole)	Crank	Multiple Heights	Height and dosage slider
Cost	0	-1	-0.5	-2	-1	-1.5
Produced locally	0	0	0	0	0	0
Repairability	0	-1	0	-1	1	-1.5
Time of use	0	0	-0.5	-1	1	-0.5
Ease of use	0	0	-0.5	0	0	-0.5
Range (x2)	0	0	0	0	-1	-1
Durability	0	-0.5	0.5	-1	0	-0.5
Universality	0	0	-0.5	-1	-1	-1
TOTAL	**0**	**-2.5**	**-1.5**	**-6**	**-2**	**-7.5**

Adding a tube seems to be the best option for accommodating different container heights, but we need to look into potential chlorine loss through length; cost; and local availability.

Variable Dosing

	User Select	weight dosing, squish	weighted dosing, spring	Variable for a range	Measuring cup
Cost	0	-0.5	-0.75	-0.5	1
Produced locally?	0	0	0	0	0
Repairability	0	-0.5	-0.5	-0.5	1
Time to learn	0	0.5	0.5	0.5	-1
Time to use	0	0	0	0	-1
Ease of use	0	-0.5	-0.5	-0.5	-1
Accuracy (x2)	0	1	1	0.5	0
Precision/repeatability	0	0	0	0	-0.5
Durability	0	-0.25	-0.25	-0.25	0.5
TOTAL	**0**	**0.75**	**0.5**	**-0.25**	**-1**

We have narrowed our dispensing mechanism options down to the two weight-based variable dosing systems. Further experimentation is needed in order to choose between the two.

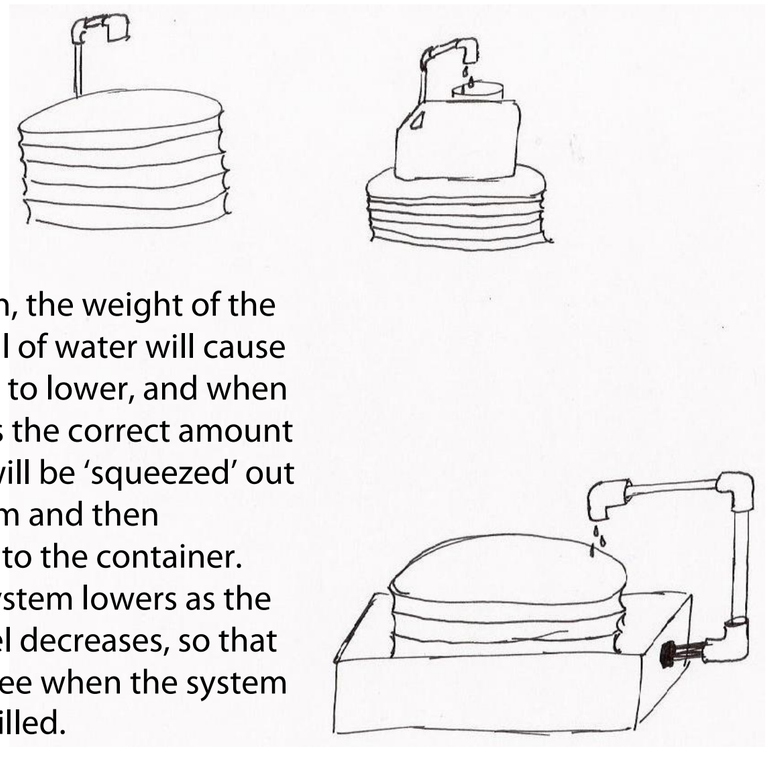
Dispensing Mechanism

	Flip Cup Disp. (Current)	Push ("syringe")	Soap Disp.	Screw Disp.	Foot Pump	"Flexible" valve for any container
Cost	0	to be determined	to be determined	to be determined	to be determined	to be determined
Produced locally?	0	1	1	1	1	-1
Repairability	0	1	1	0	1	0
Durability	0	0	0	0	-1	0
Time to use	0	0	1	-1	1	0
Time to learn	0	0	0	0	0	0
Ease of dispense (effort)	0	-1	1	0	1	0
Risk of false dispense	0	0	0	0	-1	0
Accuracy	0	to be tested	to be tested	to be tested	to be tested	to be tested
Precision	0	to be tested	to be tested	to be tested	to be tested	to be tested
TOTAL	**0**	**1**	**4**	**0**	**2**	**-1**

The soap dispenser mechanism appears to be the best option, but more reliability testing and cost investigation is planned.

Possible Design Approaches

Direct feedback variable dosing



In this design, the weight of the container full of water will cause the platform to lower, and when this happens the correct amount of chlorine will be 'squeezed' out of the bottom and then dispensed into the container. The entire system lowers as the chlorine level decreases, so that it is easy to see when the system has to be refilled.

Spring-based variable dosing

In this design, the weight of the container full of water will cause the platform to lower, and a 'stop' that is directly connected to the platform will lower, so when the pump is pressed down, it will deliver an appropriate dose of chlorine that is proportional to the weight of the water.