

Sustainability of Use of Point-of-Use Water Treatment among Students and Households in a School Program — Nyanza Province, Western Kenya, 2007 Blanton, Elizabeth; Ombeki, Sam; Oluoch, Gordon; Mwaki, Alex; Quick, Robert Enteric Diseases Epidemiology Branch Centers for Disease Control and Prevention

ABSTRACT

Background: To prevent diarrhea, in May 2007, we installed drinking water and handwashing stations in 17 schools and trained teachers to promote these behaviors to pupils. We gave schools PuR[®] flocculent-disinfectant powder for drinking water treatment and WaterGuard hypochlorite solution for handwashing water treatment. We evaluated this program on parental knowledge and behaviors, and pupil absentee rates, in September 2007 and July 2008.

Methods: We conducted a baseline survey of water handling knowledge and practices in parents of pupils from 17 schools and tested household stored water for chlorine. To implement the program, we engaged local Ministry of Education officials, conducted teacher trainings, created safe water clubs for student-to-student teaching, installed water stations, and distributed instructional comic books, encouraging students to read and discuss them with their parents. We conducted follow-up surveys and repeat household chlorine testing at 3 and 13 months post-implementation.

Results: We enrolled 662 student-parent pairs at baseline. From baseline to 3-month followup, awareness of PuR[®] (49-91%, p<0.0001) increased, WaterGuard awareness remained high (93%-92%), and there was a significant increase in household use of PuR[®] (<1-7%, p<0.0001) and WaterGuard (6-13%, p<0.0001). Household use of PuR[®] (6%) and WaterGuard (11%) was maintained after 13 months. Following program implementation, pupil absentee rates were 26% lower in 2007 than in 2006 (p<0.001) and 2005 (p<0.001); lower rates were maintained in 2008.

Conclusions: This school-based program resulted in knowledge transfer from pupil to parent and significant increases in household water treatment practices that were sustained for over one year.

WATER TECHNOLOGIES

PuR®

- Combined flocculant-disinfectant
- Clarifies water
- Provides residual chlorine
- Proven health impact:
- 26% decreased risk of diarrhea

WaterGuard

- Locally produced sodium hypochlorite solution for water treatment
- Proven health impact:
- Reduces diarrhea risk by 26-85%

Safe Water Storage

- Safe water storage in 60 liter buckets with taps
- Protects stored, treated water from introduction of hands and other objects

PROJECT OBJECTIVES

- Determine if use of PuR[®] and WaterGuard have been sustained in project schools and students' homes one year after implementation
- Determine whether knowledge of proper handwashing methods has been retained one year after implementation
- Ascertain any changes in student absentee rates over past year

PROJECT IMPLEMENTATION

- Headmaster and one teacher from each school trained by CARE-Kenya
- Proper use of WaterGuard
- Proper handwashing technique
- Installation of drinking water and handwashing stations:
- 60-liter buckets with taps
- Metal stands
- PUR[®] and WaterGuard for water treatment
- Soap









EVALUATION

Student survey

- Interviewed random sample of students at baseline and follow-up surveys at 3 months and one year
- Interviewed all available students from the same cohort as baseline and the first follow-up
- Asked water treatment knowledge and basic sanitation questions
- Observed handwashing behavior
- Household survey
- Interviewed all available heads of household from the same cohort as baseline and the first follow-up
- Asked water treatment knowledge and basic sanitation questions
- Observed handwashing behavior
- Tested water for free residual chlorine
- Absentee records

PROJECT TIMELINE



*This poster will focus on the results from the second follow-up evaluation

RESULTS: Student Survey

- Baseline 666 student
- Median age 13 years (range 8-19)
 47% were female
- Grades 4 (27%), 5 (23%), 6 (17%), 7 (21%), 8 (12%)
- Follow-up¹ 603 students
- Follow-up² 437 students



Student Knowledge and Use of PuR[®] and WG

	Baseline	Follow-up ¹	p value	Follow-up²	p value
	n=666	n=603	BL-FU ¹	n=437	FU ¹ -FU ²
	N (%)	N (%)	n=603	N (%)	n=437
Heard of PuR [®]	207 (31)	595 (97)	<0.0001	406 (98)	1.0
Ever used PuR [®]	33 (5)	521 (86)	<0.0001	379 (92)	0.0016
Correct PuR [®] treatment procedure	9 (1)	322 (53)	<0.0001	225 (54)	0.6414
Heard of WG	600 (90)	599 (97)	<0.001	406 (98)	1.0
Ever used WG	270 (41)	409 (68)	<0.0001	297 (72)	0.2733
Correct WG treatment procedure	101 (15)	216 (36)	<0.0001	93 (23)	0.0011
Demonstrate correct handwashing	149 (22)	322 (53)	<0.0001	204 (47)	0.3046

RESULTS: Household Survey

- Baseline 662 households
- Median age of caregivers 48 years (range 18-91)
- 92% female
- Median household size 6 (range 2-15)
- 95% able to read
- Follow-up¹ 644 households
- Follow-up² 536 households



Household Knowledge of PuR[®] or WG

	Baseline	Follow-up ¹	p value	Follow-up ²	p value
	n=662	n=644	BL-FU ¹	n=536	FU ¹ -FU ²
	N (%)	N (%)	n=644	N (%)	n=536
Heard of PuR [®]	322 (491)	585 (91)	<0.0001	517 (96)	0.0013
Ever used PuR [®]	54 (8)	471 (71)	<0.0001	407 (76)	0.6634
Correct procedure of PuR [®]	53 (8)	353 (53)	<0.0001	293 (55)	0.7422
Heard of WG	616 (93)	606 (92)	0.1000	514 (96)	0.7389
Ever used WG	325 (53)	391 (59)	<0.0001	356 (66)	0.0573
Correct procedure of WG	235 (35)	369 (57)	<0.01	306 (57)	0.5735
Demonstrate correct handwashing	167 (25)	266 (41)	<0.0001	254 (47)	0.1853

Household Use of PuR[®] or WG

	Baseline	Follow-up ¹	p value	Follow-up ²	p value
	n=662	n=644	BL-FU ¹	n=536	FU ¹ -FU ²
	N (%)	N (%)	n=644	N (%)	n=536
Reported use of PuR [®]	3 (<1)	108 (16)	<0.0001	79 (15)	0.1522
Confirmed use of PuR [®]	1 (<1)	49 (7)	<0.0001	30 (6)	0.1213
Reported use of WaterGuard	108 (16)	145 (22)	0.0006	121 (23)	0.8711
Confirmed use of WaterGuard	37 (6)	86 (13)	<0.0001	57 (11)	0.3074
Reported use of PuR [®] or WG	109 (16)	242 (38)	<0.0001	198 (37)	0.6315
Confirmed use of PuR [®] or WG	37 (6)	129 (20)	<0.0001	89 (17)	0.1213

Student Absentee Rates for PuR[®] Pilot Program Schools in the Spring Term*



LIMITATIONS

- Results not generalizable
- Pilot project: 17 schools relying on very turbid water
- High loss to follow-up
- 28% of students
- 17% of the households
- Study followed one cohort

Hawthorne effect





CONCLUSIONS

- Increase in knowledge of water treatment sustained in students and parents
- Increase in confirmed use of both PuR[®] and WaterGuard sustained in students' homes
- Increase in ability of students and parents to demonstrate proper handwashing techniques sustained
- Decrease in student absentee rates sustained

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How Water Gets to School





How Schools Treat Water



School Handwashing Stations





The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.