INTERVENTION FACT SHEET 1:
DATA-DRIVEN BEHAVIOR CHANGE

eawag aquatic research

Achieving long-term use of solar water disinfection in Zimbabwe

Household water treatment can guarantee safe drinking water to prevent diarrhea and cholera. However, high compliance and sustainable use is seldom achieved. The present study designed and evaluated several promotion strategies for solar water disinfection (SODIS), based on results from a baseline survey. Visits to inform households about the costs and benefits of SODIS combined with public commitment and memory aids were emerged as the best strategy, resulting in 80-90% of households using SODIS even 14 months after intervention.

Silvie Kraemer-Palacios, Rick Johnston and Hans-Joachim Mosler

Context

The consumption of unsafe water is one of the main causes of diarrhea, which leads to the deaths of an estimated of 760,000 children under the age of five worldwide each year. Households in the peri-urban areas of Harare, Zimbabwe drink unsafe water from wells, surface water, or intermittent piped water supply. Episodes of cholera are frequent in these areas. Household water treatment systems, such as solar water disinfection (SODIS), could prevent a large proportion of diarrhea cases. However they are neither frequently nor consistently used.

Objectives

The main objective of this study was to find out which behavior change strategy would be most effective in securing high compliance and sustained use of SODIS. For that purpose, first, SODIS was introduced in communities in peri-urban areas of Harare. Then, different behavior change strategies were developed and evaluated with regard to the population's sustainable uptake of SODIS.

Activities

Step 1 + 2: Identify, measure, and determine behavioral factors of SODIS use

- A baseline survey was conducted.
- A doer/non-doer analysis revealed the following behavioral factors to explain SODIS use: Knowledge about the safety of raw water (health knowledge), beliefs about the expensiveness, taste, and how time-consuming or difficult to perform SODIS is, belief about what others think about SODIS (others' approval), and whether performing SODIS is intended in the future (intention) and perceived as a habit.

Step 3: Select behavior change techniques (BCTs) and design behavior change strategies to enhance SODIS use

The following behavior change strategies were designed:

- Visits using the BCT inform households about and assess costs and benefits were followed by public commitment and the use of memory aids such as a reminder notice.
- The BCT prompt talk to others was used for a pass-on task for which community members were trained to convince other persons to use SODIS, who in turn should convince more persons, generating a 'snowball effect'.
- The pass-on-task in combination with the BCT highlight the discrepancy between set goal and actual behavior contrasted desirable behaviors with actual practices.

Step 4: Implement and evaluate behavior change strategies for SODIS use

- The behavior change strategies were evaluated through a before-after control trial.
- The strategies were implemented in four different areas. A fifth area served as control group.
- Behavioral factors and SODIS use were surveyed several times. The last survey was conducted 14 months after the latest intervention.
- The effectiveness of the promotion activities was measured by observing whether the households had SODIS bottles exposed to the sun.

Findings

- The most effective strategy was the visit to inform households about and assess costs and benefits in combination with public commitment and the use of memory aids such as a reminder notice.
- In the areas receiving these strategies, 80-90% of the households were still using SODIS 14 months after the intervention had ended.

Conclusion

This project revealed that systematic behavior change strategies make it possible to achieve highly frequent and sustainable use of household water treatment and thus the safe water consumption levels necessary for improved health.

Duration
2007 – 2009

Partners
Royal College of Surgeons in Ireland (R.C.S.I.)

Funding
European Union, FP6-Inco-CT

Further information
http://www.eawag.ch/en/department/ess/main-focus/environmental-and-health-psychology-ehpsy

Publications
Mosler, H.-J., Kraemer, S.M., Johnston, R.B. (2013). Achieving long-term use of solar water disinfection in Zimbabwe. *Public Health, 127(1),* 92-98.

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INTERVENTION FACT SHEET 2:
DATA-DRIVEN BEHAVIOR CHANGE

eawag aquatic research

Using persuasive arguments to change perceived costs and thus consumption of safe water in Ethiopia

Fluorosis is caused by undue fluoride uptake from drinking water. In the Ethiopian Great Rift Valley, the consumption of fluoride-free water from a community filter was promoted by a) a traditional information intervention targeting perceived vulnerability, and b) a systematic behavior change strategy targeting perceived costs. While the intervention targeting perceived vulnerability showed no effects, cost persuasion decreased the perceived costs to a 50% lower value and increased the consumption of fluoride-free water by 20%. This showed that altering subjective perceptions of facts like prices or walking distances can change behavior even without changing objective circumstances.

Alexandra Huber and Hans-Joachim Mosler

Context

Around 200 million people worldwide rely on drinking water that is contaminated with excess fluoride. In Ethiopia, 8.5 million people are at risk of developing fluorosis from their water due to excessive fluoride uptake. Fluoride is a naturally occurring mineral that at elevated levels becomes a geogenic contaminant in groundwater. Because there is no effective medical treatment for the disease, the prevention of fluoride uptake is crucial.

Objectives

The main objective of this study was to compare the effectiveness of two behavior change strategies in promoting the consumption of safe water from a fluoride-removing community filter.

Activities

Step 1 & 2: Identify, measure and determine behavioral factors of fluoride free water use

- Data gathering started with a baseline assessment in September 2010.
- Differences between doers (100% use) and non-doers (less than 100% users) were compared in all behavioral factors.
- Perceived monetary costs were significantly higher in non-doers than in doers, meaning that the non-doers rated the fluoride free water as 1.5 times more expensive.
- No differences in perceived vulnerability were found, meaning that both groups assessed the risk of getting fluorosis in the same way.

Step 3: Select behavior change techniques (BCTs) and design behavior change strategies to enhance fluoride free water use

- The behavior change technique (BCT) *inform about and assess costs and benefits* was selected to target perceived costs. The corresponding behavior change strategy first stressed that a higher price for a product means that this product is of higher quality. Second, a consumption and cost calculation was conducted with the household to define the real additional costs of purchasing fluoride free water solely for drinking and cooking. In this way, the household received realistic estimates of how much filtered water was required and how much money the household would have to spend per week. This calculation demonstrated that the additional costs are quite small.
- As a comparison intervention, a behavior change strategy was applied to raise risk awareness. It used the BCTs inform about and assess personal risk and arouse fear. First, the promoters asked for the names and ages of all children living in the household. Then, the promoter communicated individualized risk information for every child. The promoters showed pictures of children and adults with dental and skeletal fluorosis and indicated on a visualized scale how their risk could be reduced.

Step 4: Implement and evaluate behavior change strategies for fluoride free water use

- The behavior change strategies were evaluated through a before-after control trial.
- The local non-governmental organization implemented the interventions in October 2010.
- Half of the households received the cost persuasion strategy and the other half the risk-awareness strategy.
- A post-intervention survey was conducted in December 2010 to measure the behavioral factors and the consumption behavior.

Findings

- As expected from the baseline data, the behavior change strategy targeting health risk awareness had no effects.
- The cost persuasion strategy decreased the perceived costs by 50% and increased the consumption of fluoride-free water by 20%.

Conclusion

This project demonstrated that systematic behavior change strategies can change behavior by altering subjective perceptions of facts such as prices or walking distances even without changing objective circumstances.

Duration
2009 – 2011

Partners
Oromia Self-Help Organization (OSHO)

Funding
Swiss National Science Foundation (SNSF)
Swiss Agency for Development and Cooperation (SDC)

Further information
http://www.eawag.ch/en/department/ess/main-focus/environmental-and-health-psychology-ehpsy

Publications
Huber, A. C., Tobias, R., & Mosler, H.-J. (2014). Evidence-based tailoring of behavior-change campaigns: increasing fluoride-free water consumption in rural Ethiopia with persuasion. Applied Psychology. Health and Well-Being, 6(1), 96–118. doi:10.1111/aphw.12018

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INTERVENTION FACT SHEET 3:
DATA-DRIVEN BEHAVIOR CHANGE

eawag aquatic research

Increasing fluoride filter use in rural Ethiopia

High levels of fluoride concentrations in water can lead to fluorosis, which eventually cripples sufferers. Fluoride removal household filters are efficient in preventing it, but their effectiveness depends on adequate use. In a longitudinal study, based on the RANAS approach, behavioral factors of filter use were assessed and two behavior change strategies were developed aimed specifically at the critical behavioral factors. Both strategies, a planning and social-prompt intervention and an education workshop combined with pledging, were able to raise use to a level sufficient to prevent fluorosis. Mere provision of the fluoride removal filter led to insufficient use, but combining this with a behavior change technique led to more than 80% use of filtered water for drinking and cooking.

Ina Sonego, Alexandra Huber and Hans-Joachim Mosler

Context

In the northern Great Rift Valley in Ethiopia, fluoride concentrations in water are much higher than the guideline set by the World Health Organization. This can lead to fluorosis, with joint pain, limited joint movement, deformation of bones, and eventually physical disability. Use of fluoride removal filters can prevent symptoms effectively. However, practitioners have increasingly realized that the mere provision of infrastructure or equipment such as fluoride removal filters does not ensure that it is used sufficiently to achieve health benefits. Additional interventions to change behavior, termed behavior change techniques (BCTs) are needed. To be most effective, BCTs should be tailored to the behavioral factors steering a behavior.

Objectives

The project's main goal was to increase fluoride removal household filter use to a level sufficient for the prevention of fluorosis. We analyzed effects on behavior (fluoride removal filter use) and on psychological factors. The specific objectives were:

- To assess the behavioral factors that influence fluoride removal filter use.
- To design, implement and evaluate systematic behavior change strategies to promote the use of fluoride removal filter.
- To compare the strategies' effectiveness to the effectiveness of mere provision of fluoride removal household filters.

Activities

Step 1 & 2: Identify, measure and determine the behavioral factors determining use of fluoride removal filters:

- Partially subsidized fluoride removal household filters were provided in two rural villages in the northern Rift Valley.
- A baseline survey on filter use and behavioral determinants was conducted in September 2010 (N = 72).
- Analyses revealed the key behavioral factors affecting the use of fluoride removal filters to be habit, remembering, commitment, interpersonal communication, and health knowledge.

Step 3: Select behavior change techniques (BCTs) and design behavior change strategies to increase use of fluoride removal filters:

- Several BCTs expected to enhance the key factors affecting use of fluoride removal filters were selected and combined in two behavior change strategies.
- The first strategy, a planning and social support intervention, was designed to target habit and remembering. In a promotional visit, the household's water use was assessed and suitable times for a particular member of the household to fill the filter were found and marked on a colored circle (Figure 1). A second member of the household was asked to support the first by providing a reminder.
- The second strategy, an educational workshop combined with public commitment, was designed to target commitment, interpersonal communication, and health knowledge (Figure 2). Women were invited to a three hours' workshop on fluorosis and its prevention. At the end, the women made a public commitment by raising their hands and saying aloud that they pledged to use the filter.

Step 4: Implement and evaluate behavior change strategies:

- The strategies' effectiveness was assessed through a before-after control trial.
- One of the villages studied was chosen as control village. In the other village, the intervention village, half of the households received the social support startegy and the other the public commitment strategy.
- The behavior change strategies were implemented by the local non-governmental organization, the Oromo Self Help Organization (OSHO).

- A follow-up survey was conducted in February to May 2011 to evaluate change in behavior and behavioral factors.

Findings

- The planning and social support intervention and the educational workshop combined with public commitment increased filter use substantially.
- Filter use for drinking and cooking water consumption increased to above 80% of total consumption in the intervention village – sufficient for the prevention of fluorosis.
- Filter use for drinking and cooking water consumption was below 60% in the control village, which had only received the filter – insufficient for the prevention of fluorosis.

Conclusion

Mere distribution of fluoride removal filters did not succeed in raising use to a level sufficient for the prevention of fluorosis. The systematic behavior change strategies were necessary to introduce the behavior change required to prevent fluorosis.

Figure 1: Daily routine planning circle.

Figure 2: Educational workshop combined with pledging.

Duration
2009 – 2012

Partners
Oromia Self-Help Organization (OSHO)

Funding
Swiss National Science Foundation (SNSF)
Swiss Agency for Development and Cooperation (SDC)

Further information
http://www.eawag.ch/en/department/ess/main-focus/environmental-and-health-psychology-ehpsy

Publications
Sonego, I.L., Huber, A.C., Mosler, H.-J. (2013). Does the Implementation of Hardware Need Software? A Longitudinal Study on Fluoride-Removal Filter Use in Ethiopia. *Environmental Science & Technology, 47*, 12661−12668.

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INTERVENTION FACT SHEET 4:
DATA-DRIVEN BEHAVIOR CHANGE

eawag aquatic research

Changing handwashing behavior in southern Ethiopia through infrastructural and commitment interventions

Regular handwashing is the single most effective prevention against diarrheal disease. However, handwashing rates are low in many developing countries, including Ethiopia. A handwashing promotion project in the Borena Zone of southern Ethiopia aimed to increase handwashing rates in communities through systematic behavior change strategies. The strategies applied, especially the tippy tap promotion, proved to be more effective than a standard educational approach: 95% of intervention households were successfully motivated to construct a tippy tap. Three months after the intervention had ended, water and soap were present at the tippy tap in 50% - 80% of the households.

Nadja Contzen

Context

Handwashing with soap efficiently prevents diarrhea, one of the leading causes of disease burden globally. As in many other developing countries, handwashing rates are low in Ethiopia. Increased handwashing rates are thus the goal of many hygiene projects run by governmental and non-governmental organizations. However, the effectiveness of these projects has seldom been verified. It is expected that systematic behavior change strategies are more effective than standard approaches, which have often been limited to awareness-raising and knowledge transfer.

Objectives

The main goal of this project was to promote handwashing with soap at key times in a rural area in southern Ethiopia by means of systematic behavior change strategies. Specific objectives were

- To assess current handwashing practices and the behavioral factors determining these practices.
- To design, implement, and evaluate systematic behavior change strategies to promote handwashing.

Activities

Step 1 & 2: Identify, measure, and determine behavioral factors of handwashing:

- Qualitative research was conducted to identify potential behavioral factors.
- A baseline survey on handwashing practices and behavioral determinants of handwashing was conducted in 462 households in February and March 2012.
- The behavioral factors influencing handwashing were specified by means of regression analyses. These were others' behavior and others' approval, confidence in performance, continuation and recovering, and impediments. In addition, observations suggested that a lack of handwashing infrastructure and forgetting to wash hands were major constraints on regular handwashing.

Step 3: Select behavior change techniques (BCTs) and design behavior change strategies to promote handwashing:

- Three BCTs expected to promote the key factors of handwashing were selected. These were (1) using memory aids and environmental prompts, (2) providing infrastructure, and (3) prompting public commitment.
- The BCTs were combined in two behavior change strategies, a tippy tap promotion and a public commitment session, and implemented in combination with a standard education approach.

Step 4: Implement and evaluate behavior change strategies:

- The strategies' effectiveness was assessed through a before-after control trial.
- The behavior change strategies were implemented in three intervention villages by the local non-governmental organization, the Gayo Pastoral Development Initiative.
- The strategies were compared to a control village that only received the standard education approach (an f-diagram exercise).
- A follow-up survey on handwashing practices, behavioral determinants and the strategies' evaluation was conducted in 514 households in February and March 2013.

Findings

- 95% of intervention households were successfully motivated to construct a tippy tap.

- Three months after the intervention had ended, water and soap were present at the tippy tap in 50% - 80% of the households.
- The systematic behavior change strategies, and especially the tippy tap promotion, changed behavior more successfully than the standard education approach.
- This was because they successfully changed the critical behavioral factors of handwashing, especially others' behavior, impediments, and remembering.

Conclusion

To increase effectiveness, handwashing interventions should be based on theory and driven by data.

Figure: A tippy tap constructed in one of the villages studied.

Duration
January 2012 to September 2013

Partners
Oxfam America (OA)
Gayo Pastoral Development Initiative (GPDI)

Funding
Oxfam America

Further information
http://www.eawag.ch/en/department/ess/main-focus/environmental-and-health-psychology-ehpsy

Publications
Contzen, N., Meili, I., & Mosler, H.-J. (2015). Changing handwashing behavior in southern Ethiopia: A longitudinal study on infrastructural and commitment interventions. *Social Science & Medicine, 124,* 103–114. doi: 10.1016/j.socscimed.2014.11.006

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INTERVENTION FACT SHEET 5:
DATA-DRIVEN BEHAVIOR CHANGE

Increasing shared toilet users' cleaning behavior: the case of urban slums in Kampala, Uganda

Access to shared toilets is the most common on-site mode of sanitation in urban informal settlements. However, their maintenance depends on users' appropriate usage and cleaning behavior. A user-driven sanitation (UDS) project in Kampala's urban slums aimed to increase shared toilet users' cleaning behavior. Group discussions between users of a shared toilet were applied in combination with public commitment as a behavior change strategy. The strategy increased cleaning behavior by up to 30%.

Innocent K. Tumwebaze and Hans-Joachim Mosler

Context

In Uganda, around 50 % of the urban population relies on shared sanitation, and this percentage is even higher in Kampala's slums. However, the management of shared toilets (defined as facilities jointly used by different families, mostly known to each other or sharing a compound house) is poor, and most of these toilets are in an unhygienic condition.

Objectives

The overall goal of this research project was to promote the cleaning of shared toilets among their users to ensure good hygiene. Specific objectives included

- assessing the cleanliness of shared toilets and the behavioral and social dilemma factors that influence users' cleaning behavior, and
- designing, implementing, and evaluating the effectiveness of behavior change strategies in increasing the cleaning behavior of shared toilet users.

Activities

Step 1 & 2: Identify, measure and determine behavioral factors of shared toilet cleaning

- A baseline survey on shared toilets' cleanliness and the psychological and social dilemma factors influencing collective cleaning behavior was conducted between December 2012 and January 2013 in three slums.
- The survey revealed that attitudes, norms, ability, and self-regulating factors had to be targeted.

Step 3: Select behavior change techniques (BCTs) and design behavior change strategies to increase shared toilet cleaning

- Two BCTs were selected, the prompt to talk to others, delivered through group discussions, and written public commitment.
- Interventions targeted respondents with dirty toilets, that is, non-frequent cleaners.

Step 4: Implement and evaluate behavior change strategies of shared toilet cleaning

- The strategies' effectiveness was assessed through a before-after control trial.
- They were implemented by Sustainable Sanitation and Water Renewal Systems (SSWARS).
- Half of the intervention households received only the group discussions
- The other half received the group discussions in combination with the written public commitment.
- Additional households served as a control group.
- A follow-up survey on cleaning behavior and behavioral factors was conducted between August and September 2013

Findings

- Cleaning behavior in intervention groups increased by up to 30% compared to 8% in the groups with no discussions.
- Discussions combined with a written public commitment were most effective in increasing the cleaning behavior of shared toilet users.
- Discussions effectively changed behavior as they increased a number of behavioral factors: others' approval of cleaning, personal importance of cleaning, feelings (liking to clean), and reduced barriers to cleaning.

Figure: Group discussion session in Kironde zone, Rubaga Municipal Council.

Conclusion

Improved sanitation, even of shared toilets, can be achieved through systematic behavior change strategies, specifically a group discussion supplemented with written public commitment. Applying this strategy at a larger scale would change the sanitation situation in developing countries dramatically.

Duration
February 2010 to September 2013

Partners
Sustainable Sanitation and Water Renewal Systems (SSWARS)

Funding
Swiss National Centre of Competence in Research (NCCR) North-South

Further information
http://www.eawag.ch/en/department/ess/main-focus/environmental-and-health-psychology-ehpsy

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