Systematic Behavior Change

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Environmental and Health Psychology
Environmental Social Sciences

Eawag: Swiss Federal Institute of Aquatic Science and Technology

Introducing handwashing

But no compliance

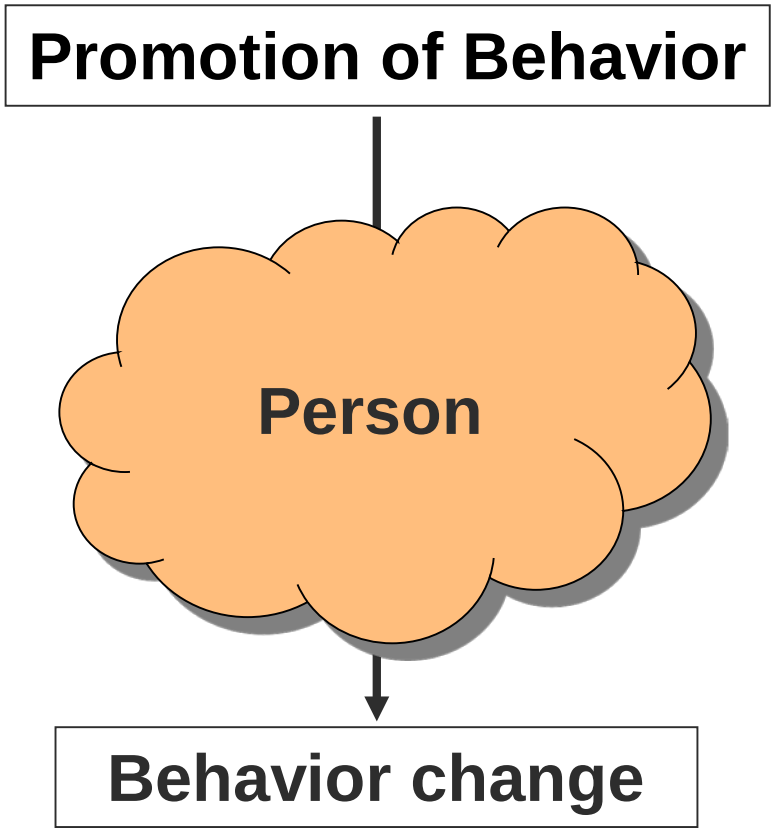
Promoting SODIS

But only limited or partial or even no uptake

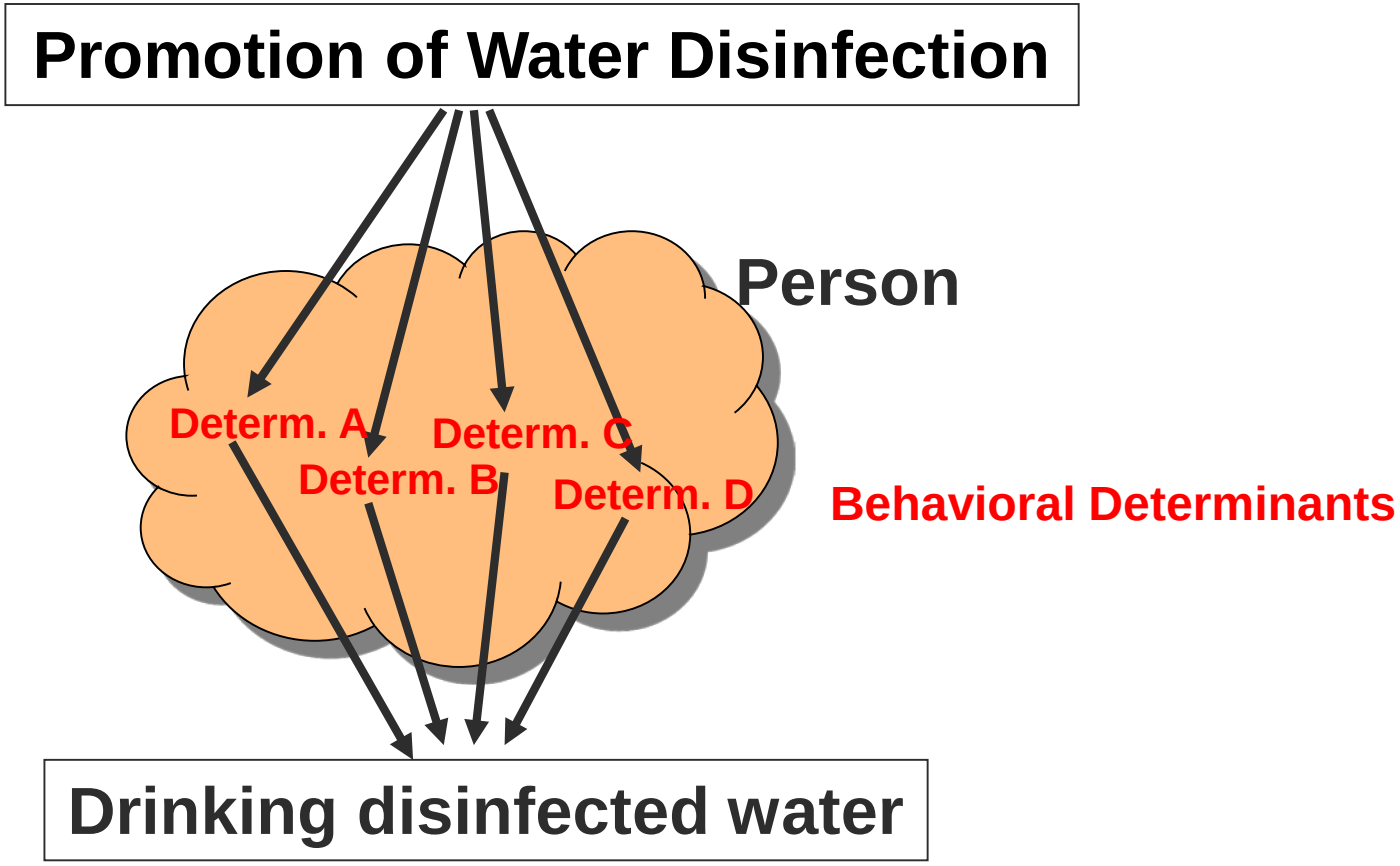
Working with CLTS

But some communities change to Open Defecation Free others don't

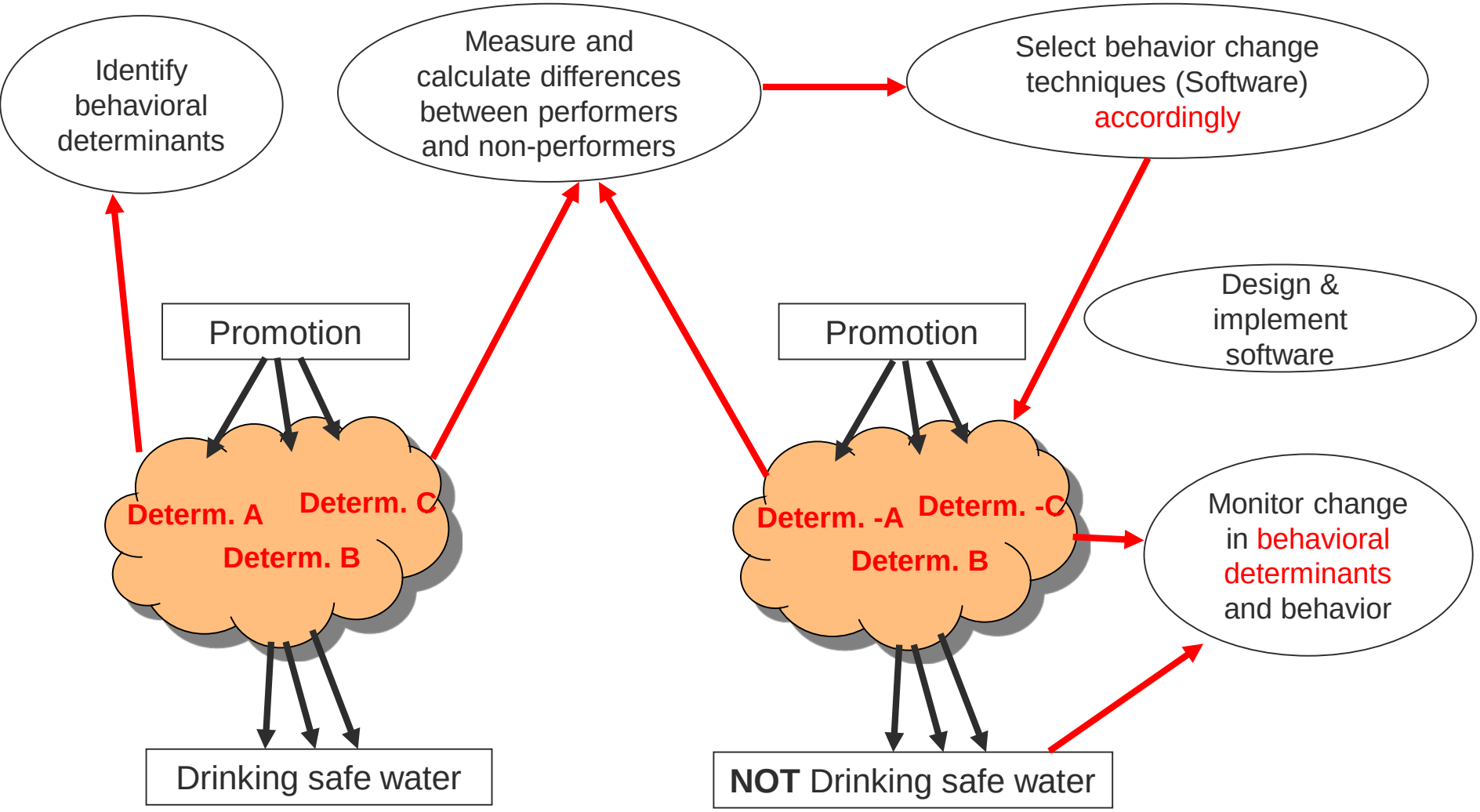
How to introduce behavior change?



Behavioral Determinants have to be changed



To generate sustainable behavior change we have to understand the mode of operation of promotion activities



Systematic Behavior Change

1) a) Identify behavioral determinants
➔ RANAS-Model
b) Measure and calculate differences between Doers and Non-Doers
➔ Standardized survey

2) Select and design behavior change techniques
➔ RANAS Table of determinants vs. techniques

3) Evaluate change in behavioral determinants and behavior
➔ Pre-Post survey

Systematic behavior change:

- Theory based
- Data-driven
- Population tailored

Data-driven Behavior Change Protocol

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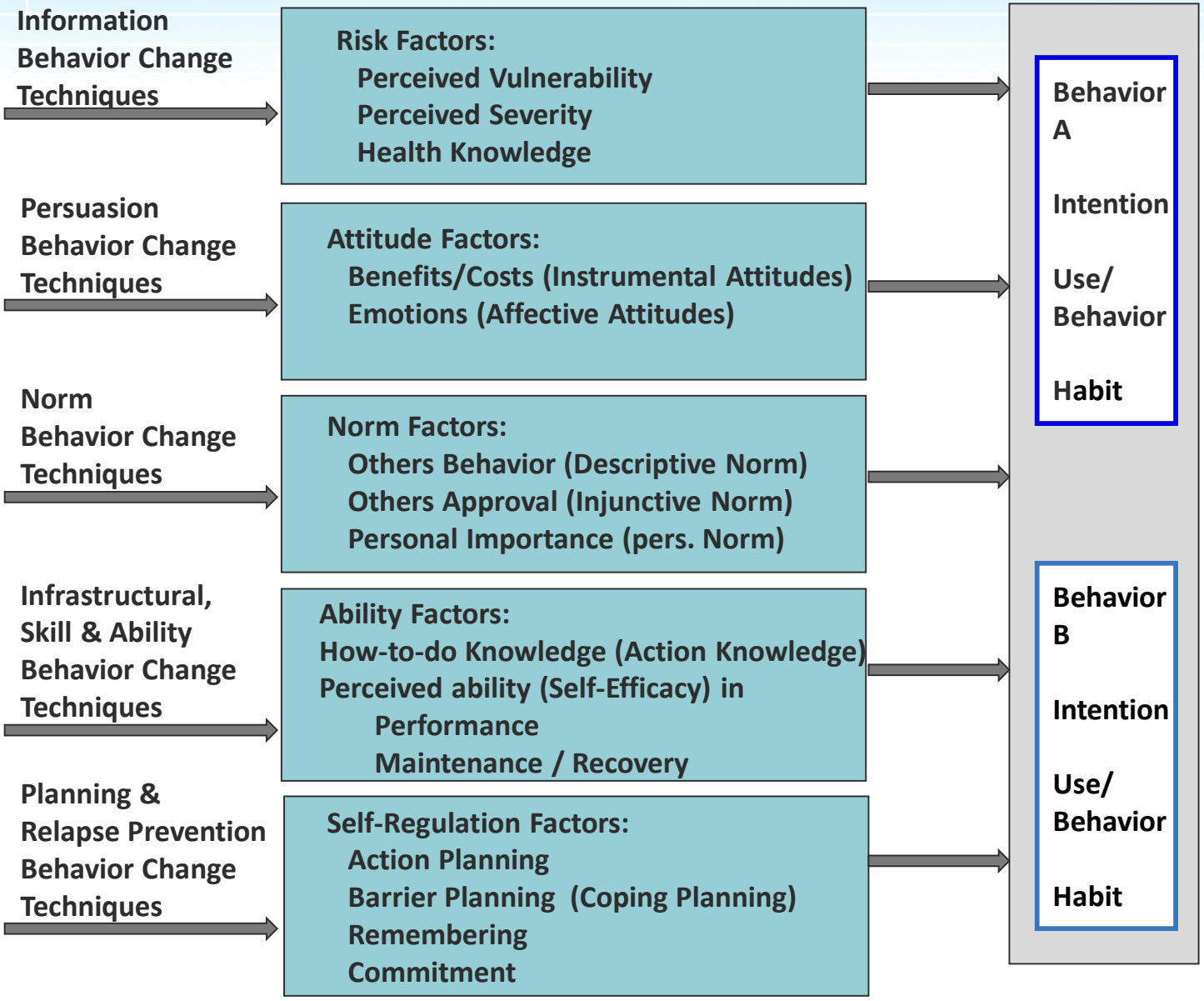
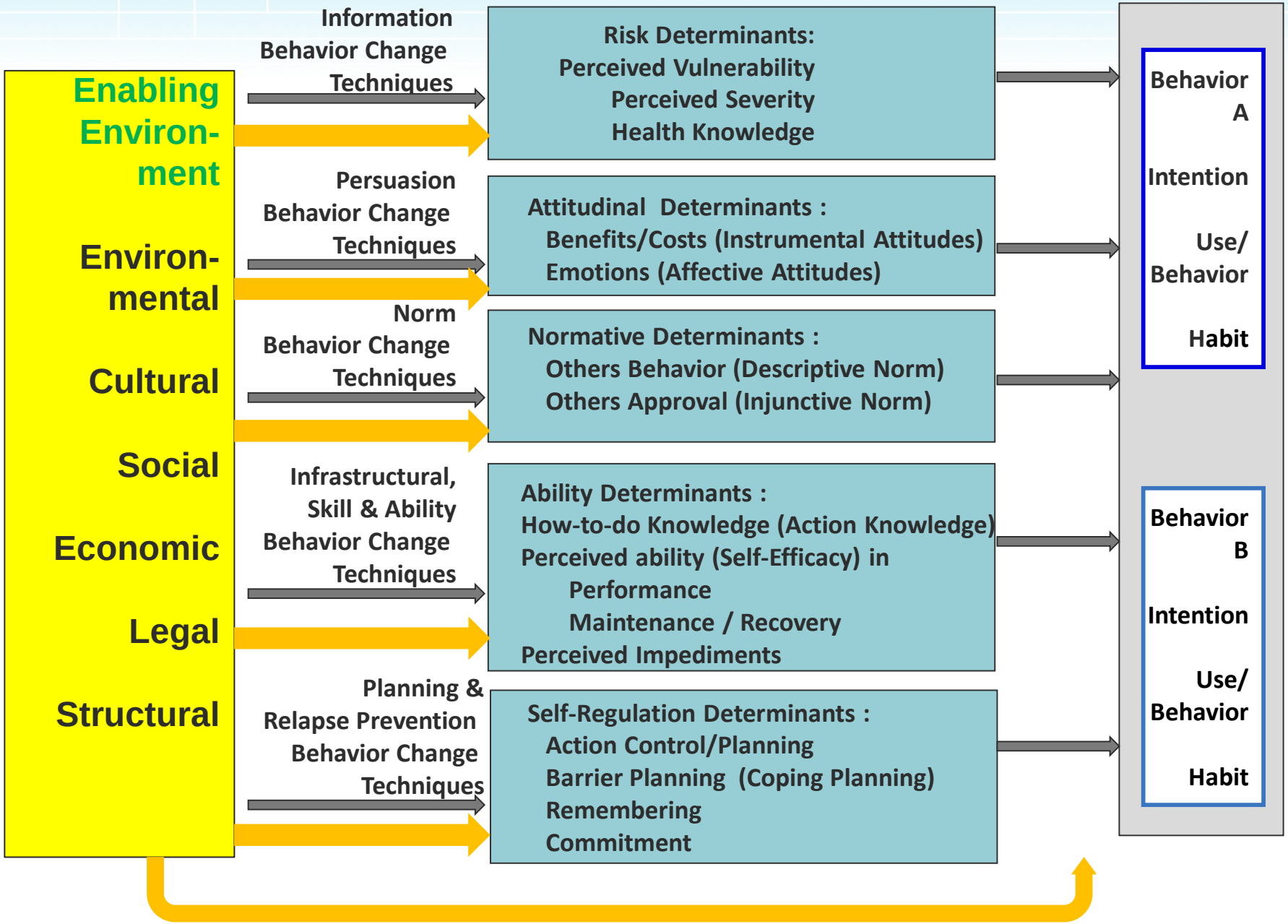
The RANAS-Model: Risk, Attitudes, Norms, Ability and Self-regulation



Mosler, H.J. (2012). A systematic approach to behavior change interventions for the water and sanitation sector in developing countries: a conceptual model, a review, and a guideline. International Journal of Environmental Health Research, 22 (5), 431-449.

The RANAS-Model: Risk, Attitudes, Norms, Ability and Self-regulation



Example 1: Arsenic in Bangladesh

- 20 Mio. at risk
- Health effects: arsenicosis

  → Prevention

- Access to arsenic-safe water options
- Behavior change: Fetching water from safe wells

Standardized survey: questionnaire

Beh. Factor	Item example
Knowledge	Open-ended: Can you tell me how you can contract arsenicosis? → 1 point per correct answer → sum score.
Vulnerability	How high or low do you feel are the chances that you get arsenicosis when drinking unsafe water? [-4 = very low ..... 4 = very high]
Severity	Imagine that you contracted arsenicosis, how severe would be the impact on your life in general? [0 = not sever ..... 4 = very severely]
Affective attitude	How much do you like or dislike arsenic-safe disinfected water? [-4 = I dislike it very much ..... 4 = I rather like it]
Injunctive norm	Do you think that, overall, people who are important to you rather approve or disapprove that you drink arsenic-safe water? [-4 = nearly all disapprove .... 4 = nearly all approve]
Descriptive norm	How many of your relatives drink arsenic-safe water? [0 = (Almost) nobody (0%) ..... 4 = (Almost) all (100%)]
Self-efficacy	Are you sure that you can produce as much arsenic-safe water as you need within the next month? (very unsure – very sure)
Coping planning	Have you made a detailed plan regarding what to do when you are hindered to collect your arsenic-safe water? [0 = No detailed plan at all ..... 4 = Very detailed plan]

Method data collection

- **Face-to-face interviews:**
  - Team of local interviewers, supervisors
  - Duration: 1-1.5 hours

- **Structured questionnaire:**
  - Water consumption
  - Behavioral determinants
  - Contextual factors

- **Participants:**
  - Randomly selected households
  - Person responsible for drinking water

Calculate Doer – Non-Doer Differences

Person	Doer	Person	Non-Doer
A	4	B	2
C	5	D	3
E	4	F	3
G	3	H	2
I	5	J	4
K	3	L	2
M	1	N	1
O	4	P	1
Q	5	R	3
S	4	T	2
	3.8		**2.3**

Others Approval (Injunctive Norm)

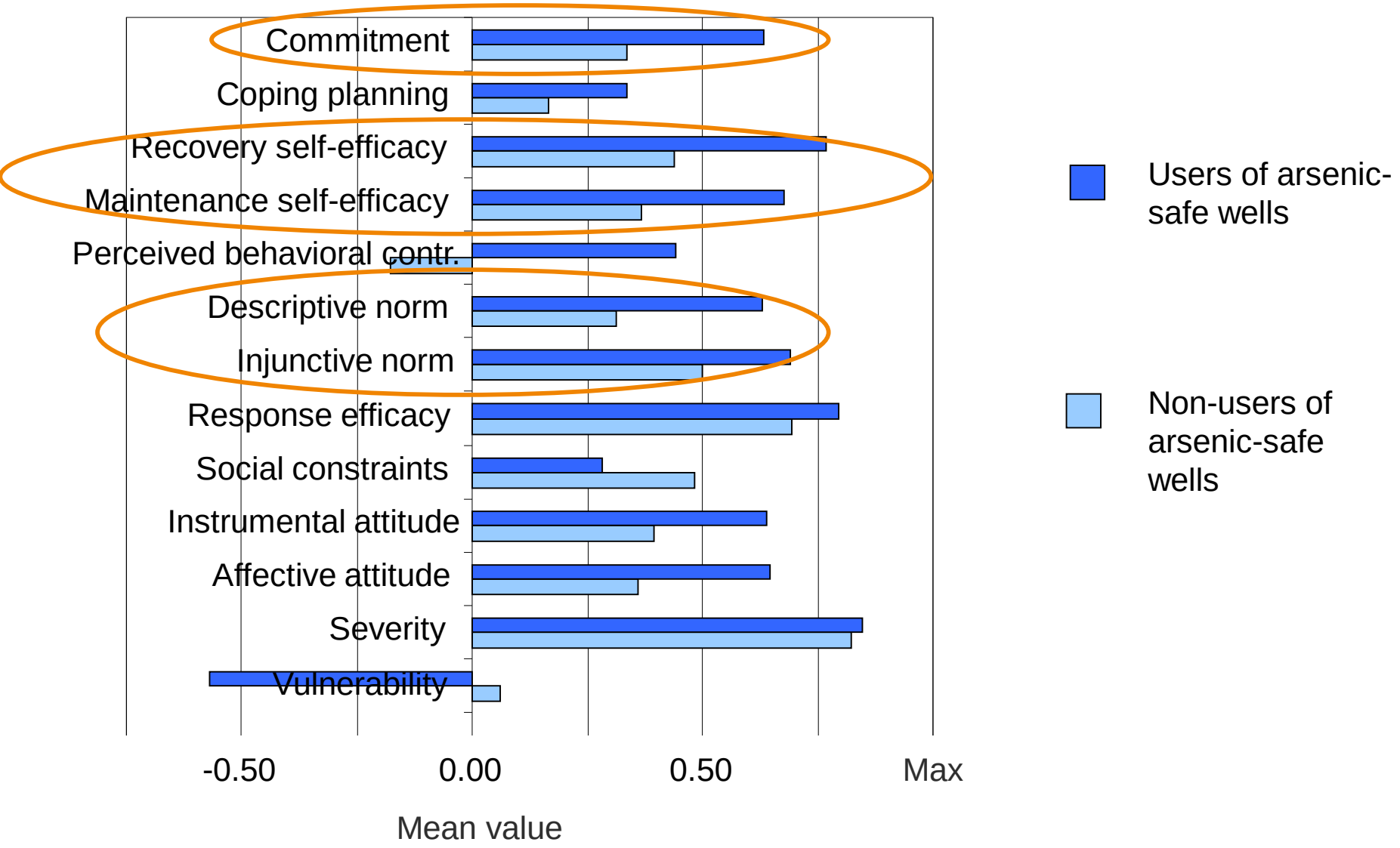
Do you think that, overall, people who are important to you rather approve or disapprove that you drink arsenic-safe water?
1 = nearly all disapprove
2 = Significantly more disapprove
3 = The same amount disapprove and approve
4 = Significantly more approve
5 = nearly all approve

Mean = Sum / Num Persons

➔ **Big difference between Doers and Non-Doers in Injunctive norm**
➔ **this factor has to be tackled**

Approach pinpoints which behavioral factors are to be changed (we know exactly what to change)

Behavioral factors (means) for non-users and users:



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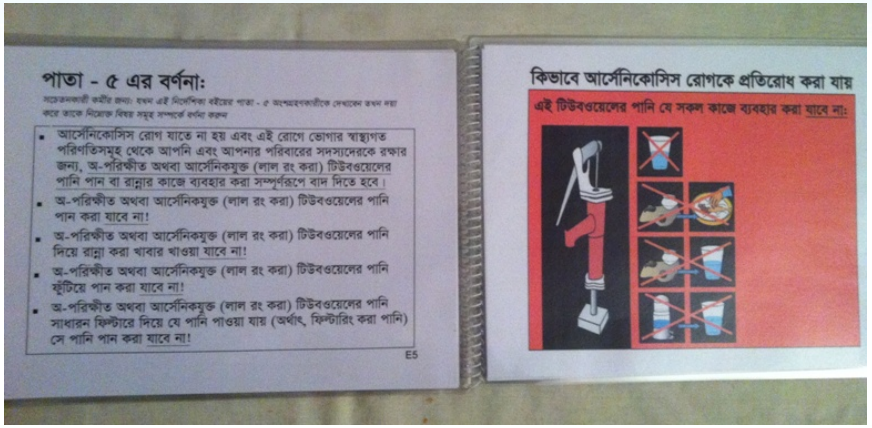
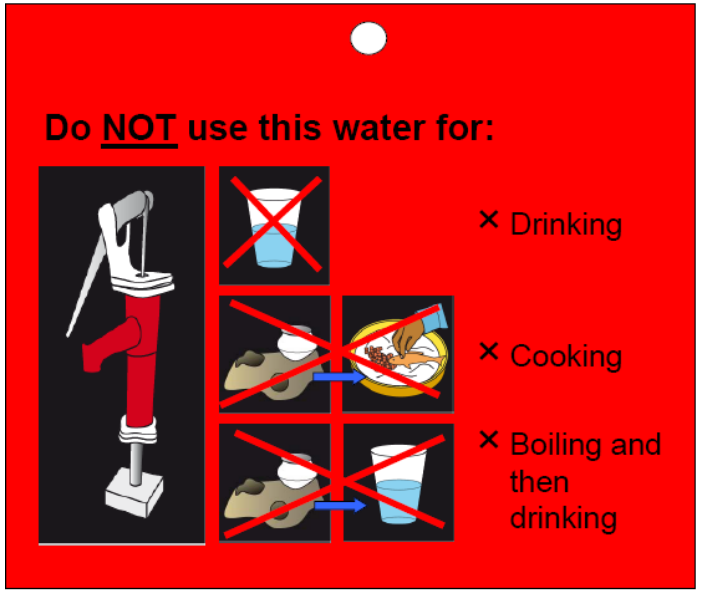
Factors of the RANAS model	*Behavior Change Techniques (BCTs)*
Information BCTs – Risk Factors	
Health knowledge	**1. Presentation of facts / knowledge transfer**
	2. Showing scenarios
Vulnerability	**3. Personal risk information**
	4. Personal risk assessment
Severity	**5. Fear arousal**
Persuasive BCTs – Attitudinal Factors	
Beliefs about costs and benefits	**6. Information and assessment of costs and benefits**
	7. Use persuasive attributes
	8. Talking to others
Feelings	**9. Describe and assess feelings about performing the behavior**
	10. Describe and assess feelings about consequences of the behavior
	11. Confront with contradictions between thinking and acting
	12. Use subsequent reward
Norm BCTs – Normative Factors	
Descriptive norm	**13. Highlighting norms**
	14. Public commitment
Injunctive norm	**15. Informing about others' approval / disapproval**
Personal norm	**16. Anticipated regret**
	17. Provide a positive group identity for those engaging in the target behavior
	18. Prompt identification as role model

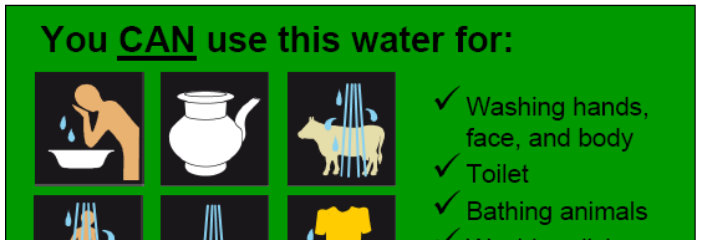
Infrastructural, skill and ability BCTs – Ability Factors	
Action knowledge (skills)	19. Provide instruction
Self-efficacy	20. Setting up infrastructure
	21. Guided practice
	22. Facilitating resources
	23. Prompt organization of social support
	24. Modeling
	25. Reattribution of past successes and failures
	26. Use argument to bolster self-efficacy
	27. Set graded tasks / goals
	28. Prompt behavioral practice
Maintenance (coping) self-efficacy	29. Coping with barriers
	30. Prompt self-monitoring of behavior
	31. Provide feedback on performance
Recovery self-efficacy	32. Coping with relapse
Planning & relapse prevention BCTs – Self-regulation Factors	
Action control (planning)	33. Prompt specific planning
	34. Outcome feedback
Coping planning	35. Teach to avoid environmental prompts / cues
	36. Provide instruction on resisting social pressure
	37. Provide negotiation arguments and skills
Remembering	38. Memory aids and environmental prompts / cues
Commitment	39. Prompt goal setting
	40. Agree a behavioral contract

Educational session ➔ Control



Provide Feedback ➔ Maintenance Self-Efficacy





Coping ➔ self-efficacy

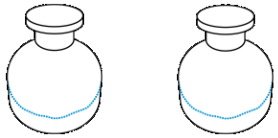
Every day after / before 

(getting up / breakfast /.....)

and after / before  and after / before 

I am going to walk to *Mubarok*'s tubewell

(name of green tubewell owner)

and I am going to collect 

(number of kolshi)

for  and  ".

(drinking / cooking / drinking and cooking)

Signature

When, where and how plans

Public commitment: ➔ commitment + descriptive norm

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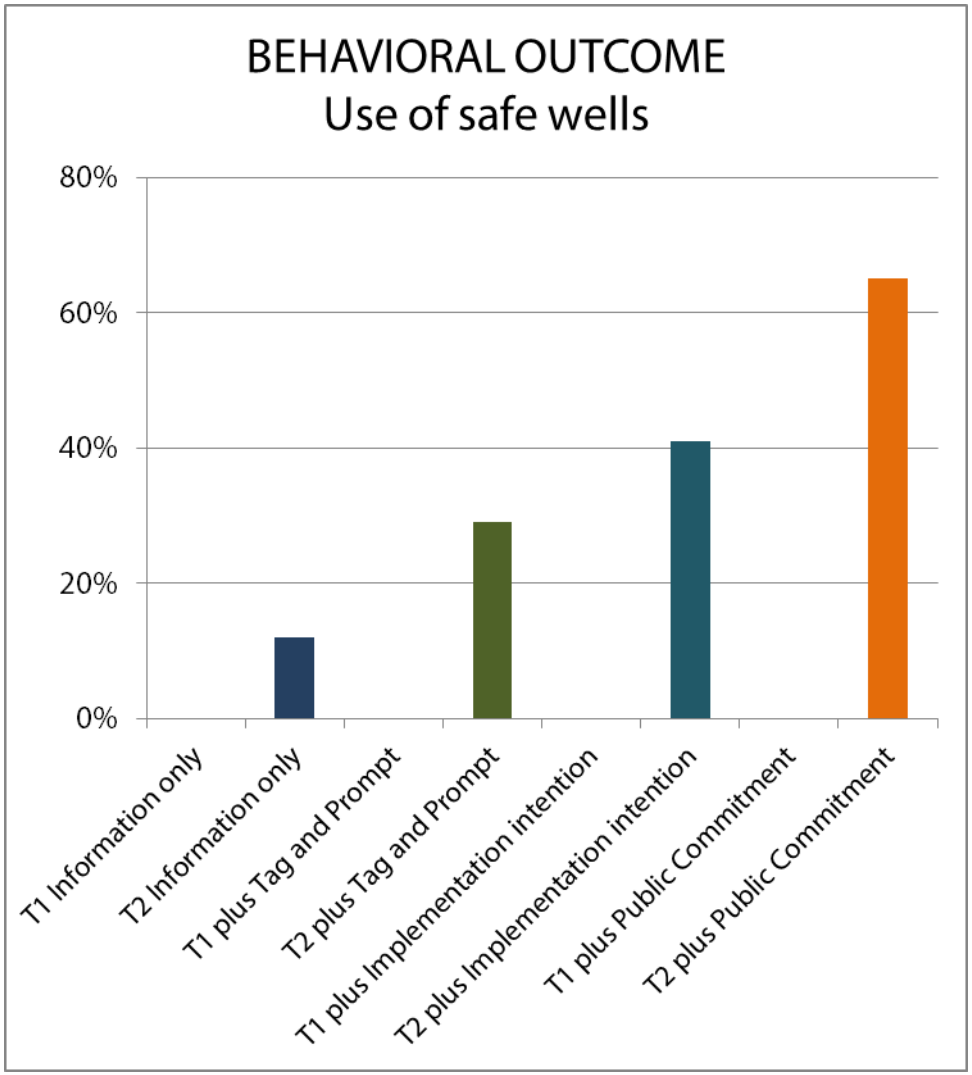
Evaluating change in Behavior



Systematic Behavior Change Techniques (BCTs) are more effective than interventions based on common sense

Cost effectiveness for the BCTs in Bangladesh

Total costs	BDT	USD	Behavior change effects	Effective-ness ratio	Cost ratio of standard inter-vention
Information only	60.0	0.8	0.14	-	-
Reminders + info	135.0	1.7	0.36	2.4	2
Implementation intentions + reminders + info	145.0	1.8	0.53	3.6	2
Public commitment + impl. Intentions + reminders + info	195.0	2.4	0.65	4.4	3

➔ **Systematic BCTs are 4-5 times more effective but only 3 times more expensive**

Evaluating change in determinants:

Before - After Differences

Inauen, J., & Mosler, H.-J. (2013). Developing and testing theory-based and evidence-based interventions to promote switching to arsenic-safe wells in Bangladesh. *Journal of Health Psychology*. doi:10.1177/1359105313493811

Evaluating change in determinants:

Calculate Before - After Differences

Person	Intervention	Person	No Intervention
A	2-5 = 3	**B**	2-3 = 1
C	1-3 = 2	**D**	1-3 = 2
E	2-4 = 2	**F**	2-2 = 0
G	2-5 = 3	**H**	2-3 = 1
I	1-5 = 4	**J**	1-2 = 1
K	3-5 = 2	**L**	3-3 = 0
M	1-4 = 3	**N**	1-3 = 2
O	1-5 = 4	**P**	1-2 = 1
Q	2-5 = 3	**R**	2-3 = 1
S	1-3 = 2	**T**	1-1 = 0
	2.8		**0.9**

Others Approval (Injunctive Norm)

Do you think that, overall, people who are important to you rather approve or disapprove that you drink arsenic-safe water?
1 = nearly all disapprove
2 = Significantly more disapprove
3 = The same amount disapprove and approve
4 = Significantly more approve
5 = nearly all approve

First Value = before Intervention
Second value= after Intervention

Mean Change =
Sum of Differences / Number Persons

➔Big difference in change between Intervention and No Intervention in Injunctive Norm ➔ the factor aimed at really changed

Example 2: Fluoride in the African Rift Valley

Dental & skeletal fluorosis

- WHO guideline: 1.5 mg/l
- Rift Valley surface- & groundwater contaminated with 2-30 mg/l
- Medical treatment difficult & ineffective → prevention
- physical, social and psychological impacts

Fluoride-removal options

based on the *Nakuru technique*

- Bone char (charred animal bones)
- Contact precipitation (Ca PO_4 pellets)

1) Community filter

2) Household filter

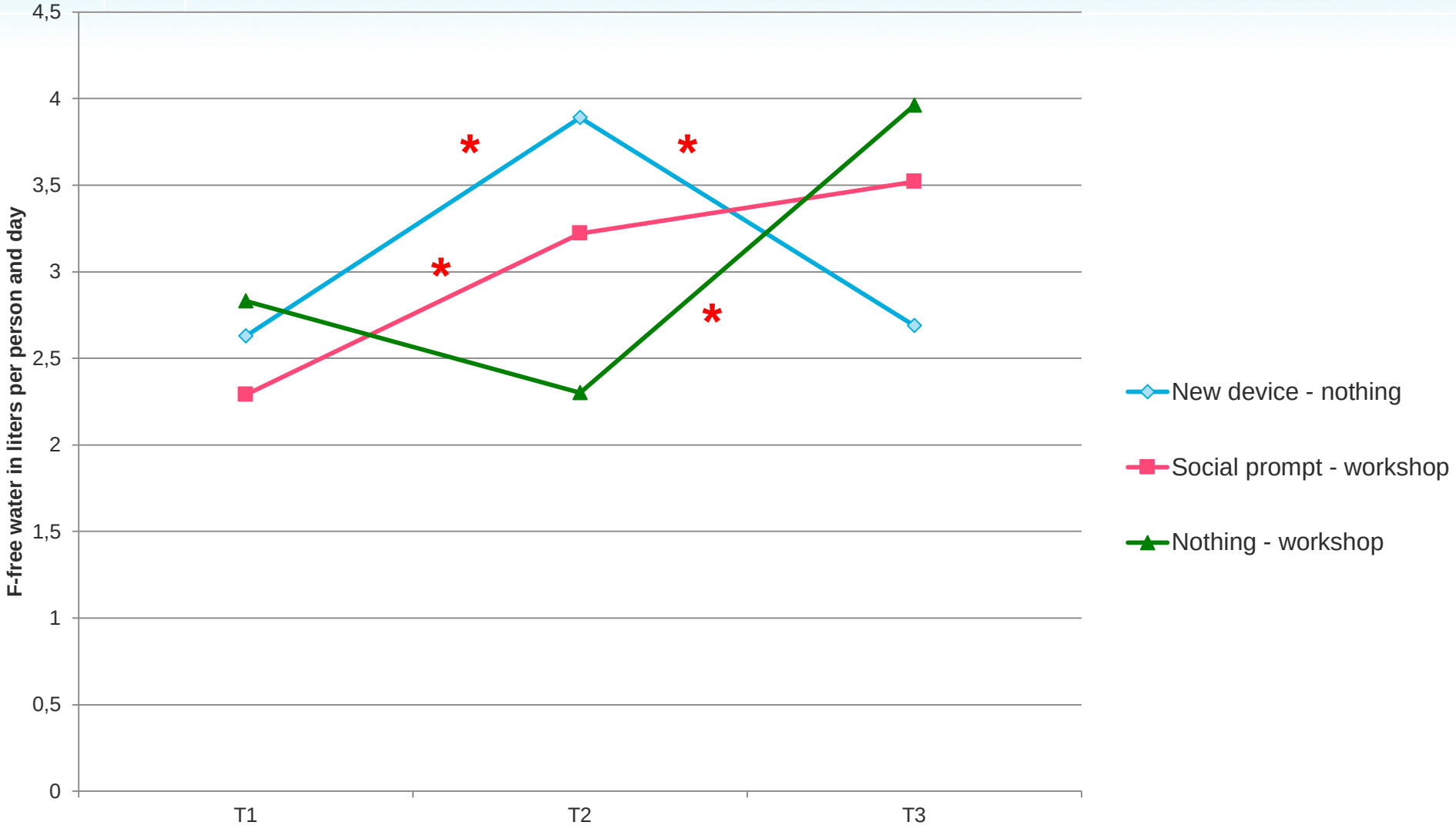
Method

- Study areas: 5 villages, 180 HF & 160 CF beneficiaries
- Face-to-face interviews → high illiteracy rate
- Standardized questionnaires
- Translation into Amharic and Oromic
- Training of interviewers (prior to every survey)
- Pretest of questionnaire

Study on household filters

Group	Survey	Intervention	Survey	Intervention	Survey
Group 1	Baseline T1 Sept. 2010	New Filter	Survey T2 Febr. 2011	x	Survey T3 May 2011
Group 2 Filter before		Social prompt		Workshop & commitment	
Group 3 Filter before		x			
	T1		T2		T3

Intervention effects



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.

Conclusions of household filter study

1. Technical intervention alone is not enough to sustain behavior

   → after implementation of the new technology a psychological intervention is crucial

2. Psychological interventions increased behavior (50% to over 80%)

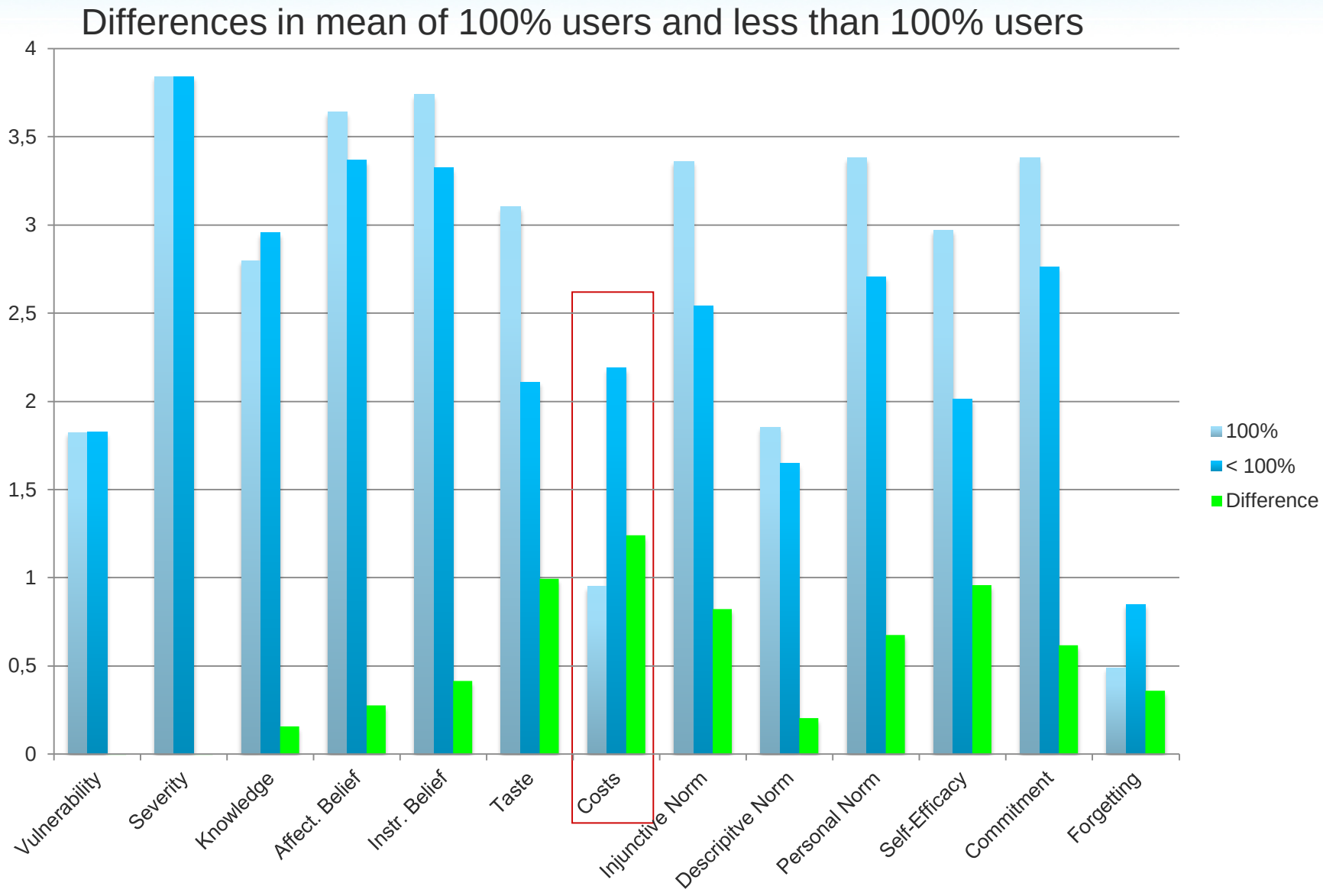
3. Double psychological intervention not necessary (workshop after prompt insignificant increase)

Fluoride removing community filter

Bishaan Dhugaatii fi nyaata bilcheesuuf Bishaan Calaltuu fiiloraayidii Uummattaan Yero Hundaa haa fayadamnuu!

ለመጠጥ እና ምግብ ለማብሰል ሁል ጊዜ ከጋራ የፍሎራይድ ማጣሪያ ውሃ እንጠቀም!

Results of baseline



Interventions to increase community filter usage

Common practice	Evidence-based
Promotion manuals (NGO approach) → mostly recommended	Baseline survey (research)
→ Awareness creation → risk perception	→ highest intervention potential → influence + potential to increase

Perceived vulnerability

Perceived costs

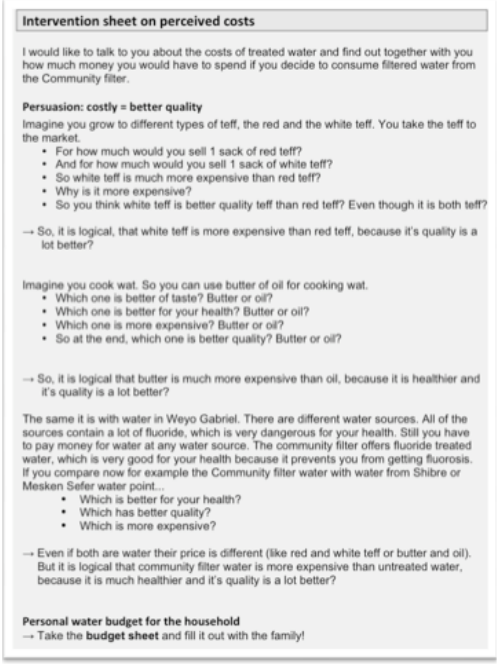
Persuasion on perceived costs

Higher price = better quality

- Examples with common things (red teff vs. white teff, oil vs. butter)

Personal water budget

- Promoter calculates water consumption of family
- How much water do they need from community filter?
- How much money does it cost?



Intervention sheet on perceived costs

I would like to talk to you about the costs of treated water and find out together with you how much money you would have to spend if you decide to consume filtered water from the Community filter.

Persuasion: costly = better quality

Imagine you grow to different types of teff, the red and the white teff. You take the teff to the market.

- For how much would you sell 1 sack of red teff?
- And for how much would you sell 1 sack of white teff?
- So white teff is much more expensive than red teff?
- Why is it more expensive?
- So you think white teff is better quality teff than red teff? Even though it is both teff?

→ So, it is logical, that white teff is more expensive than red teff, because it's quality is a lot better?

Imagine you cook wat. So you can use butter of oil for cooking wat.

- Which one is better of taste? Butter or oil?
- Which one is better for your health? Butter or oil?
- Which one is more expensive? Butter or oil?
- So at the end, which one is better quality? Butter or oil?

→ So, it is logical that butter is much more expensive than oil, because it is healthier and it's quality is a lot better?

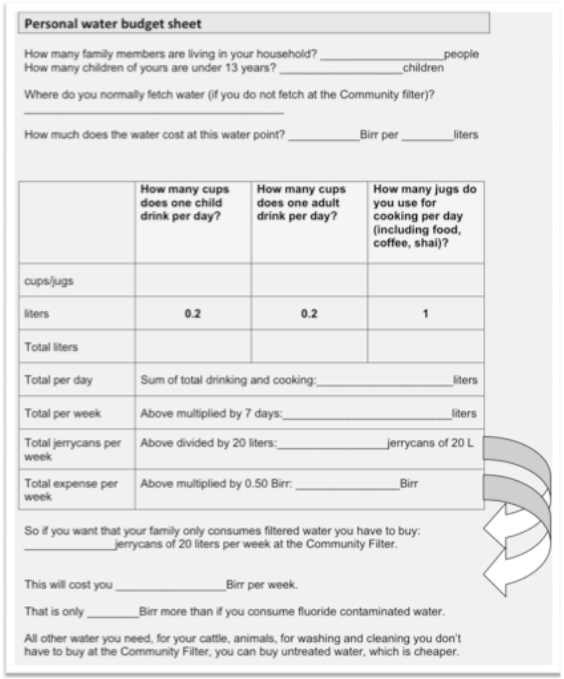
The same it is with water in Weyo Gabriel. There are different water sources. All of the sources contain a lot of fluoride, which is very dangerous for your health. Still you have to pay money for water at any water source. The community filter offers fluoride treated water, which is very good for your health because it prevents you from getting fluorosis. If you compare now for example the Community filter water with water from Shibre or Mesken Sefer water point...

- Which is better for your health?
- Which has better quality?
- Which is more expensive?

→ Even if both are water their price is different (like red and white teff or butter and oil). But it is logical that community filter water is more expensive than untreated water, because it is much healthier and it's quality is a lot better?

Personal water budget for the household

→ Take the **budget sheet** and fill it out with the family!



Personal water budget sheet

How many family members are living in your household? _____people
How many children of yours are under 13 years? _____children

Where do you normally fetch water (if you do not fetch at the Community filter)?
_____

How much does the water cost at this water point? _____Birr per _____liters

	How many cups does one child drink per day?	How many cups does one adult drink per day?	How many jugs do you use for cooking per day (including food, coffee, shai)?
cups/jugs			
liters	0.2	0.2	1
Total liters			
Total per day	Sum of total drinking and cooking:_____liters		
Total per week	Above multiplied by 7 days:_____liters		
Total jerrycans per week	Above divided by 20 liters:_____jerrycans of 20 L		
Total expense per week	Above multiplied by 0.50 Birr: _____Birr		

So if you want that your family only consumes filtered water you have to buy:
_____jerrycans of 20 liters per week at the Community Filter.

This will cost you _____Birr per week.

That is only _____Birr more than if you consume fluoride contaminated water.

All other water you need, for your cattle, animals, for washing and cleaning you don't have to buy at the Community Filter, you can buy untreated water, which is cheaper.

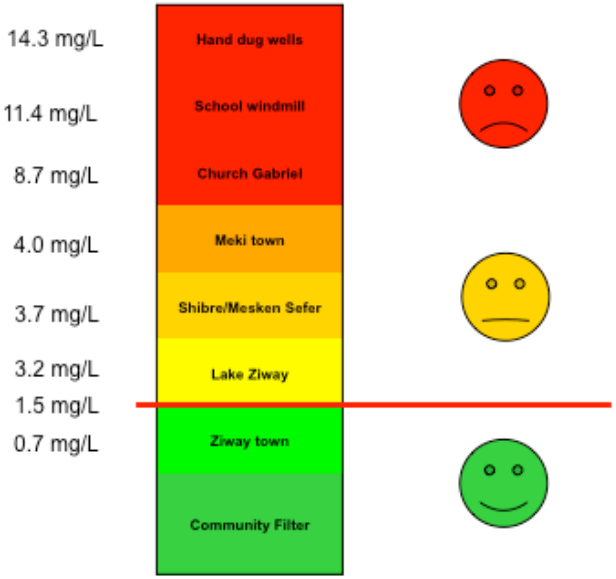
Persuasion on children‘s vulnerability

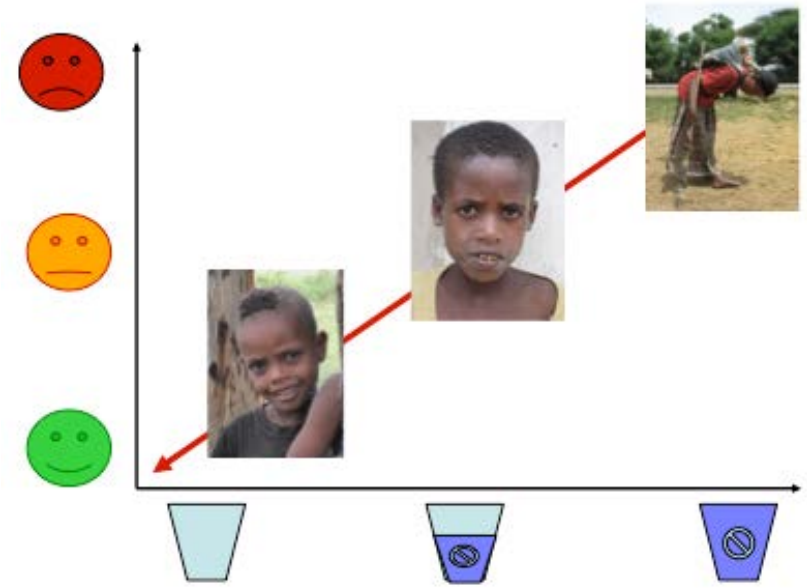
1) Current water source contaminated

2) Personal risk information for all children

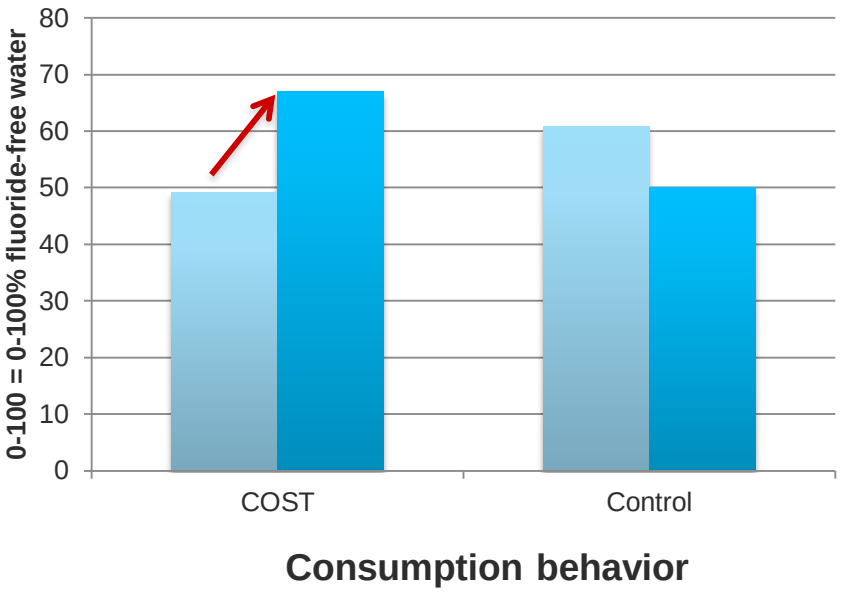
→ Individualized undeniable messages!

3) What can you do?

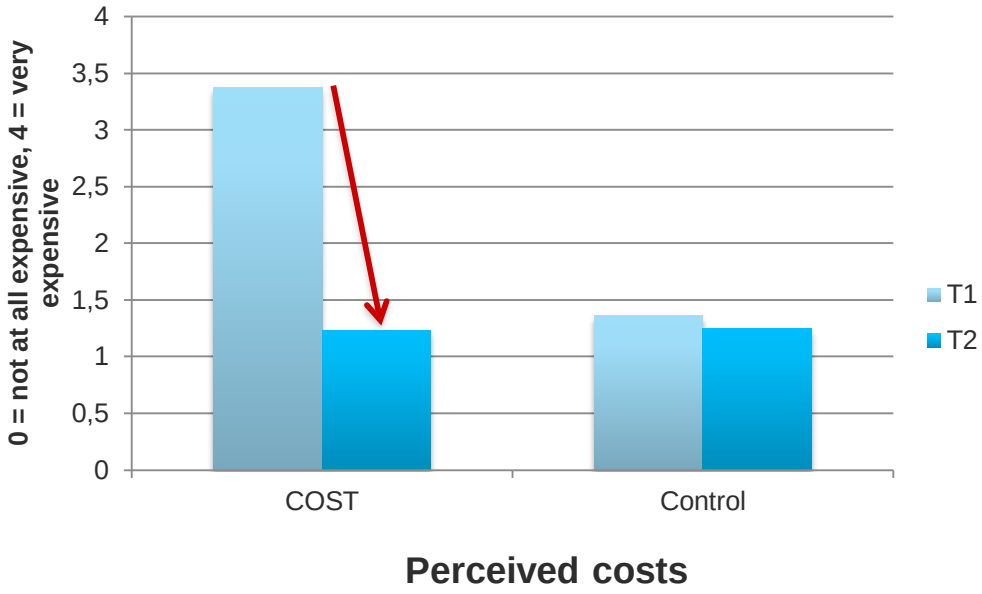




Results: Evaluation of evidence-based cost persuasion

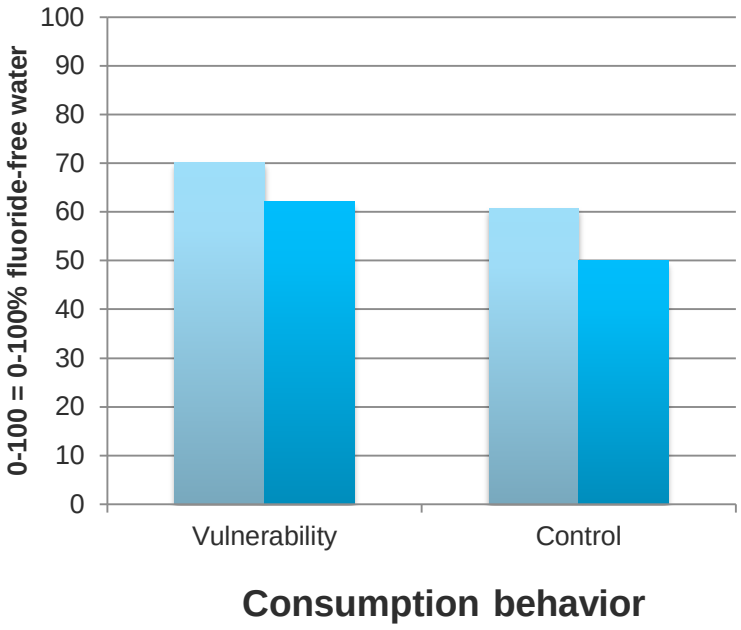


Consumption behavior

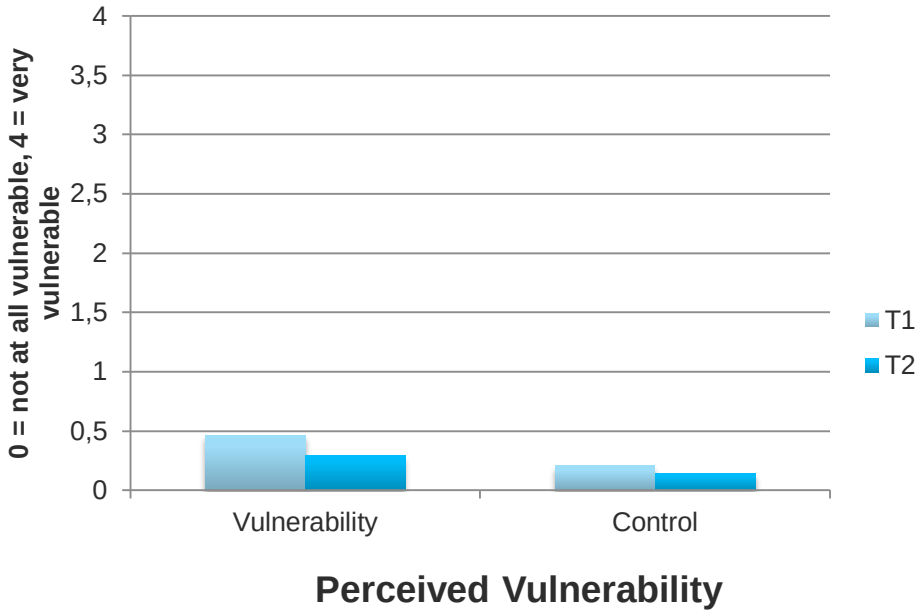


Perceived costs

Results: Evaluation vulnerability persuasion



Consumption behavior



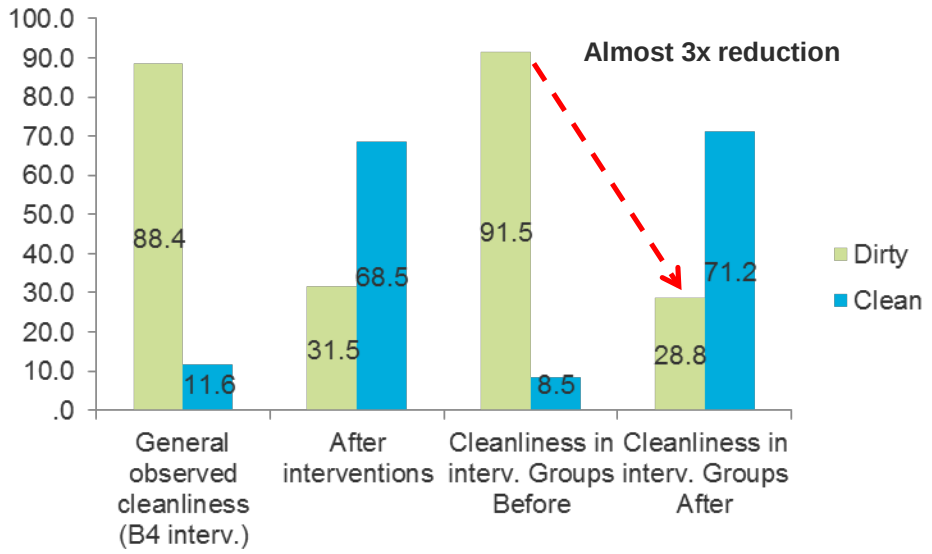
Perceived Vulnerability

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

Conclusions of community filter study

- With persuasion campaigns, behavior can be changed without changing objective barriers (e.g. actual price)
- Evidence-based interventions are more effective than interventions based on common practice

Example 3: Cleaning of Shared toilets in Kampala, Uganda

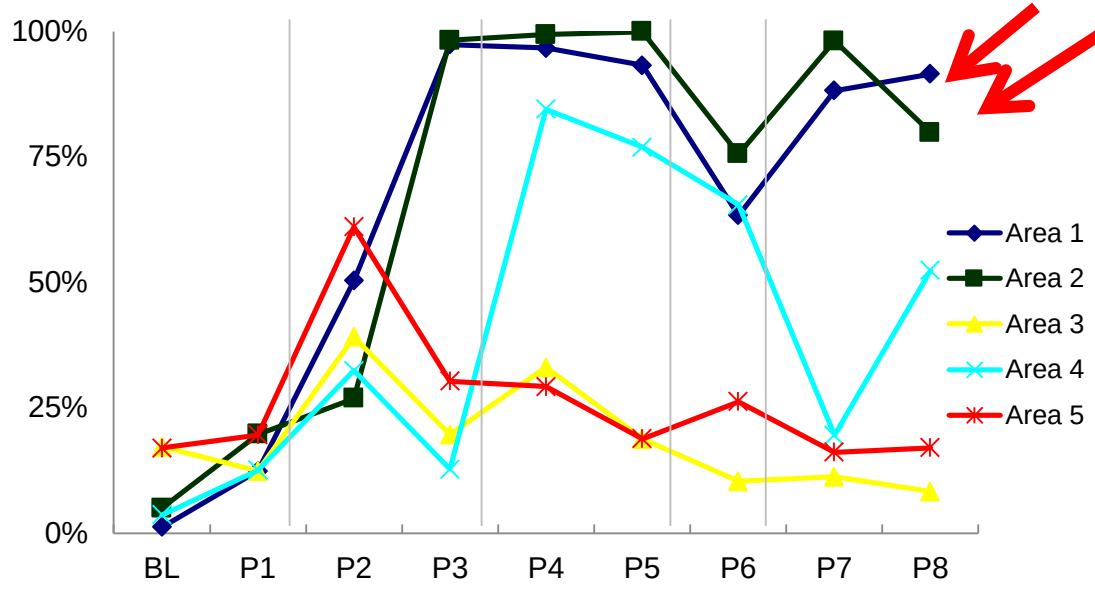


By implementing group discussions and additionally commitment cleanliness of shared toilets could be improved by factor 3

Tumwebaze, I.K., Mosler, H.-J. (2014). Shared toilet users' collective cleaning and determinant factors in Kampala slums, Uganda. BMC Public Health 2014, 14:1260 doi:10.1186/1471-2458-14-1260

Example 4: Solar water disinfection (SODIS) in peri-urban Harare, Zimbabwe

75% - 85% of the households have observed SODIS bottles in the sun even 18 months after intervention



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.

Example 5: Handwashing after a drought emergency in Borena Zone, Ethiopia

Inducing Tippy tap construction and public commitment

- 94% - 95% of intervention households were successfully motivated to construct a tippy tap
- After 2-3 months of intervention termination, in 50% - 80% of the households water and soap were present at the tippy tap

Contzen, N., Meili, I.H., Mosler, H.-J. (2015). Changing handwashing behavior in southern Ethiopia: A longitudinal study on infrastructural and commitment interventions. Social Science and Medicine, 124, (2015), 103-114.

Value of the approach has been proved:

Safe water:

1. Promotion of household and community filter use for fluoride removal in Ethiopia (SDC/SNF)
2. Promotion of use of alternative water sources for arsenic in Bangladesh
3. Test of behavior change strategies to promote chlorination of drinking water to prevent Cholera in Chad (WHO)
4. Survey on arsenic removing sand filter use in Vietnam
5. Promotion of Solar Water Disinfection in Bolivia, Nicaragua, Zimbabwe (EU funded)
6. Improving transport and safe storage of drinking water in Benin (GIZ)

Value of the approach has been proved:

Sanitation:

6. Test of behavior change strategies about purchasing and using flood resistant toilets as well as hygiene behaviors in Dakar, Senegal (Oxfam America)
7. User driven sanitation in Kampala, Uganda (NCCR North/South)
8. Assessing the drivers of households' willingness-to-pay for improvement of fecal sludge management in Ouahigouya, Burkina Faso
9. Determining the effectiveness and mode of operation of CLTS: The DEMO-CLTS study (BMGF)

Value of the approach has been proved:

Hygiene:

10. Factors determining the effectiveness of Oxfam's public health promotion approach in Haiti (Oxfam America)
11. Effectiveness of hygiene behavior change promotion in a drought response in southern Ethiopia (Oxfam America)
12. Measures to improve general hygiene in Burundi (GIZ)
13. Developing and testing handwashing campaigns in schools and households in Zimbabwe and Burundi (SDC)

Solid waste:

14. Testing of intervention strategies for recycling, reuse, and composting of solid waste in Santiago de Cuba (SDC/SNF)

Publications:http://www.eawag.ch/forschung/ess/schwerpunkte/ehpsy/Publikationen/index

A guideline for behavior change:
http://www.eawag.ch/forschung/ess/schwerpunkte/ehpsy/index_EN

General Conclusion

To assure use, uptake, compliance it is necessary to conduct an systematic behavior change approach by

1. Work out the difference in determinants between Doers and Non-Doers (Intenders and Non-Intenders)
2. Determine behavior change techniques corresponding to the differentiating determinants
3. Test and evaluate different behavior change strategies
   ➔ then scale-up

Systematic behavior change should be an integral and equal part of development projects

Thank you for your attention!