

1st Report of the SODIS Sustainability Study – Nepal



Executive summary

The SODIS sustainability study was designed to close an important research gap – to collect information on the sustainability of HWTS/SODIS promotion projects at household and institutional levels. Several information sources were included: interviews using standardized questionnaires at household level, with previous promoters, and with previous implementing partner organizations as well as general stakeholder in the water sector. The SODIS sustainability study intends to compare three countries where SODIS promotion at household and institutional level has already been taken place since several years.

This first report of the SODIS sustainability study presents the data collected in Nepal. SODIS has been promoted in Nepal since 2004 by a national NGO called ENPHO. Main activities of ENPHO took place in the Kathmandu valley, comprising urban and rural areas of different characteristics. Implementing partners were at first local NGOs, later the focus was shifted to work with municipalities, the health and education sector as well as large international agencies.

During the study in Nepal, 1078 households of 21 communities of 5 different project phases (from 2004 to 2009) were investigated. These 21 communities comprised rural, periurban and urban areas as well as low, mixed and middle income areas in 5 different districts of the Kathmandu valley.

Results at household level show that half (54%) of the total sample is entirely consuming safe water. The biggest success was achieved in the urban areas of the big cities Kathmandu and Lalitpur, where in some communities almost nobody consumes untreated water anymore. In rural areas as well as in the case of newly installed water treatment plants, people still tend to believe their water is safe to consume (which may or may not be true). Overall, the most popular treatment options used are candle filters (43%), followed by SODIS (21%), boiling (12%), buying water (7%), and chlorination (4%).

The approach of using promoters providing group trainings on HWTS as a first intervention, followed by household visits, can be viewed as appropriate and successful. Promoters and household visits have proven to make people trying out SODIS and becoming regular SODIS users. Also, the promoters themselves view these strategies as adequate and successful. Only longer follow-up periods are demanded, as many promoters perceived the given project time frame of usually 12 months as not being sufficient to establish a sustainable behavior change.

Motivational factors to consume a certain type of water are of emotional and social nature. Creating positive emotions (e.g. liking the taste of a certain water type), stimulating social influence and social exchange in form of communication are needed. Once people are using SODIS, habit factors like daily routine and automaticity are important to make people regular SODIS users. Here, the same measures as already demanded by the promoters would be helpful – longer follow-up periods to establish stronger habits. Also, planning interventions and reminders should be helpful for habit development.

Project implementation in urban areas by either local NGOs or municipalities showed equal effectiveness in making people consume 100% safe water as well as using SODIS as a water treatment option. In rural areas, a very positive experience with regard to SODIS use was made with the health sector as the implementing partner. In general, working with governmental institutions poses great potential, because they are permanent institutions and have a large network at grassroots level. However, the need of local NGOs cannot be neglected; especially in areas with weak governmental structures they could possibly play an important initiative role. Overall, institutional sustainability can be judged as quite elaborated since in all ongoing HWTS promotional activities, SODIS is included as one of the options.

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1 Introduction

Every year, 1.8 million people, mainly children under the age of five, die of diarrhea. Roughly one third of diarrheal diseases in developing countries are caused by contaminated drinking water. In places, where no central and safe water supply systems exist, point-of-use water treatment at the household level becomes essential. Point-of-use water treatment methods, such as Solar Water Disinfection (SODIS), reveal a great potential to reduce the diarrhea burden by disinfecting drinking water. Comprehensive microbiological research has demonstrated the effectiveness of SODIS to destroy diarrhea-causing pathogens in contaminated drinking water. Several health impact studies have shown that the diarrhea incidence of SODIS users has dropped by 16-57%.

SODIS promotion activities take place since the year 2000, many of them initiated by Eawag/Sandec. Looking at the uptake of the SODIS method at grassroots (household) level one year after project implementation, 40-80% of the trained people used SODIS on a regular basis. In many cases, NGO partners report that the SODIS method is not self-sustainable after its initial introduction into a community, although in a few cases self-promotion has been observed after a SODIS promotion had taken place.

No information has been gathered so far on the level of continued long-term application of SODIS in the field, several years after the promotion project has been terminated. Correspondingly, we identified a knowledge gap which we intend to close with this project. The aim of this project is to evaluate the sustainability of SODIS application in Nepal, Indonesia and Bolivia several years after project termination. In particular, we would like to assess project strategies, local conditions and factors that support or hinder the long-term success of SODIS projects and quantify the level of continued long-term application at grassroots level.

The project uses three different information sources:

- 1) Quantitative questionnaires for the assessment of long-term SODIS use on the household level and individual influence factors.
- 2) Quantitative questionnaire with former promoters for the assessment of former SODIS promotion strategies.
- 3) Qualitative semi-structured interviews with HWTS stakeholders for the assessment of institutional change processes initiated by the SODIS promotion activities and commitment at the institutional level.

The know-how gained during this investigation will be used to adjust the future SODIS promotion and dissemination strategy of Eawag/Sandec.

This first report represents the results of the SODIS sustainability study in Nepal.

2 Methods

As just mentioned above, the sustainability study relied on 3 different information sources, assessed each with different tools and methods (Table 1).

Table 1. Overview of information sources and applied methodological tools.

Information source	Tool	Topics
Households (approx. 100 per project – total 1078)	Quantitative questionnaire applied by specially trained interviewers in Nepali	<ul style="list-style-type: none"> – Household demographics – Health status and risk awareness – Water consumption – Motivations related to different consumed water types – Habits related to SODIS water consumption – Promotion campaign perception – Communication
Promoters (1 per community – total 16)	Quantitative / qualitative questionnaire applied by main investigator in English (with simultaneous translation to Nepali)	<ul style="list-style-type: none"> – Community demographics – Project details and evaluation – Training of the promoters (TOT) – Promotion and follow-up activities of the households – Bottle supply scheme – Knowledge of SODIS
Institutions – Implementing partners (1 per project – total 9)	Semi-structured interview applied by main investigator in English (with simultaneous translation to Nepali if necessary)	<ul style="list-style-type: none"> – Organizational structure and main activities – Commitment related to HWTS – Network with other organizations – Project description – Description and evaluation of promotion activities – Community demographics – Lessons learnt for the institution
Institutions – General stakeholder in the HWTS sector (total 8)	Semi-structured interview applied by main investigator in English (with simultaneous translation to Nepali if necessary)	<ul style="list-style-type: none"> – Organizational structure and main activities – Commitment related to HWTS – Network with other organizations

Note: All questionnaires can be found in the Annex.

Household level interviews

The questionnaires conducted at the household level contained closed questions for acquiring the quantitative information (demographical data, quantity of consumption of different water types, opinions about SODIS, knowledge level about SODIS) and some open questions for qualitative information (reasons for use/non-use of water treatment, participation in promotion events). These questionnaires were filled in during an interview conducted by a trained Nepalese interviewer (mostly students). The questions were read out to the interviewee and the answer was then coded by the interviewer. Often people only answer yes or no – then the interviewer was trained to ask further for a more detailed answer. The interview did not last longer than 30 minutes. The interviewed person was the person responsible for water (treatment) in the household.

Interviews with the promoters

With the promoters, a short questionnaire was filled out when the community was visited. The promoters' questionnaire left more space for talking about experiences and problems than the one for the households. Some questions required scaled answers; these were obtained in a similar way as described for the household level interviews.

Institutional interviews

All of the interviews with the institutions were carried out after finding a suitable date and time. Usually, the institutional representative was visited at his/her office at the institution. A semi-structured expert interview was carried out. In case of an interview with a formerly implementing institution, the interview was lead more structured whereas in case of an interview with a general stakeholder, mostly room was given to their own preference of topics. All interviews were voice recorded for later transcription.

3 Nepal

For Eawag/Sandec, the main partner for SODIS and HWTS promotion in Nepal is ENPHO (Environment and Public Health Organization). In 2003, in collaboration with Unicef, DWSS and Eawag/Sandec tests were conducted at different altitudes to test SODIS efficiency under the Nepalese conditions. Already at that time, ENPHO was the main partner.

In 2004, SODIS promotion activities started with a small scale first 1-year-phase in 26 communities in the 5 different districts, 3 in the Kathmandu valley and 2 in Terai. ENPHO selected 5 different local partner NGOs which implemented the SODIS promotion activities. The selected communities in the first phase were periurban and urban areas, rather low income and contained some squatter and slum areas. In the following second phase, starting 2005, the focus was shifted to more middle class communities in the Kathmandu valley. Again, main implementing partners were local NGOs. In addition to the collaborations with NGOs, a collaboration with the Kathmandu municipality got established to test bottom-up institutionalization.

With the start of the third phase, in 2006/07, some major changes took place. First, focus was shifted completely to governmental institutions as the implementing partner to achieve an up-scaling of promotion activities. Focus was still on the Kathmandu valley with Lalitpur municipality being one partner and a sub-division of the Ministry of Health, the District Public Health Office (DPHO) of Kathmandu, the second partner. The approach used in the third phase was, in contrast to the second phase, a top-down approach. In addition to these large scale community based activities, school activities were initiated via a collaboration with one of the Education Training Centers in the Kathmandu valley (Dhulikel, Kavre district). Second, the promotional focus was taken away from mainly SODIS promotion and shifted towards a more integrated approach promoting boiling, chlorination, filtration and SODIS with equal weighting. During the following fourth phase, in 2007/08, the institutional collaborations were expanded to two more municipalities and two more DPHOs, all in the Kathmandu valley, but more rural/farmers' areas.

Until the end of the fourth phase, the most heavily populated areas in the Kathmandu valley had been targeted. Consequently, major effort was undertaken during the fifth phase to reach out to

other regions of Nepal, namely the Terai. Four additional municipalities in the Terai region became the implementing partners in 2008/09.

3.1 Investigated communities

In the following Table 2, the communities selected for the sustainability analysis are presented. Selection criteria were promotion phase, implementing organization, urbanization and income level. It was tried to have as much variety as possible. The SODIS sustainability study focused only on communities in the Kathmandu valley, because large scale promotion in the Terai only started during the fifth phase.

In the following analyses, only those 820 households knowing SODIS will be looked at (if not stated otherwise), because those who have not been targeted by the promotion campaigns (and therefore not knowing of SODIS) are not of interest for the current study.

As mentioned, the communities were selected based on 4 criteria: year of promotion activities (5 phases), implementing organization (NGO, municipality or DPHO), urbanization level (rural, periurban or urban), and estimated income level (low, mixed or middle). These different types of communities were found in 4 different districts of the Kathmandu valley: Kathmandu, Lalitpur, Thimi, and Bhaktapur. Urban Kathmandu and Lalitpur are very similar areas as well as the rural areas of Bhaktapur and Lalitpur. As can be imagined, we were by far not able to investigate all combinations. The following combinations we were able to find (Table 3, Table 4).

Table 2. Communities of investigation.

Promotion Phase	Implementing Organization	Type of Promoters	Urbanization Level	District	Income Level	Name of Community	Area / Code No.	No. of interviewed Households	No. of households knowing SODIS
I 2004-05	Lumanti (NGO)	Paid volunteers	urban	KTM	low	Sankahamul	1 / 01	46	35
						Pathivare	2 / 01	53	47
						Thimi	3 / 02	53	42
	ECCA (NGO)	Paid staff	rural	BKT	low & middle	Sipadol 5	4 / 03	58	55
						Sipadol 6	5 / 03	43	34
Nawa Chatrodaya (NGO) ^{a)}	Paid volunteers	urban	Thimi	middle	Tigani	6 / 04	53	46	
WEPCO (NGO)	Paid staff	urban	Lalitpur	middle	Kopundole	7 / 05	51	44	
II 2005-06	Prayatna Nepal (NGO) ^{a)}	Paid staff	rural	Lalitpur	low & middle	Sankhadevi Bisandul	8 / 06	107	93
	KMC	World Vision	urban	KTM	middle low	Dallu Awas	9 / 07	44	25
						Bishnumati	10 / 08	56	36
						Ilanani	11 / 09	50	39
III 2006-07	LSMC	WG	urban	Lalitpur	middle	Gachhe	12 / 09	47	32
						Gahiti	13 / 09	49	35
						Sitapaila	14 / 10	55	33
	DPHO KTM	FCHV	peri-urban	KTM	low to high	Icchangu ^{b)}	15 / 10	46	32
						Dadikot	16 / 11	51	37
IV 2007-08	DPHO BKT	FCHV	rural	BKT	low & middle	Sirutar	17 / 11	50	28
						TMC	Students (CV)	urban	Thimi
	Chapacho	19 / 12	31	28					
	Balkumari	20 / 12	50	31					
V 2008-09	LSMC	THP	urban	Lalitpur	middle	near Sundhara	21 / 13	50	42
TOTAL								1078	820

Note: BKT = Bhaktapur, CV = City Volunteer, DPHO = District Public Health Office, EccA = Environmental Camps for Conservation Awareness, FCHV = Female Community Health Volunteer, KMC = Kathmandu Metropolitan City (Municipality), KTM = Kathmandu, LSMC = Lalitpur Sub-Metropolitan City (Municipality), NGO = Non-Governmental Organization, TMC = Thimi Metropolitan City (Municipality), THP = Toile Health Promoter, Wepeco = Women Environment Preservation Committee, WG = Women Group.

^{a)} nobody from the institution could be found to be interviewed. ^{b)} no promoter could be found to be interviewed from this community.

Table 3. Combinations of phase, implementing organization, urbanization and income level as well as district. Number of households (N) and percentages (%) of total N are given.

Phase	Organization	Urbanization	Income	District	N	%	Area No. ^{a)}	Code ^{b)}
I	NGO	urban	low	KTM	82	10%	1, 2	01
I	NGO	urban	middle	Thimi	88	11%	3, 6	02 & 04
I	NGO	rural	mixed	BKT	89	11%	4, 5	03
II	NGO	urban	middle	Lalitpur	44	5%	7	05
II	NGO	rural	mixed	Lalitpur	93	11%	8	06
II	Municipality	urban	middle	KTM	25	3%	9	07
II	Municipality	urban	low	KTM	36	4%	10	08
III	Municipality	urban	middle	Lalitpur	106	13%	11, 12, 13	09
III	DPHO	periurban	mixed	KTM	65	8%	14, 15	10
IV	DPHO	rural	mixed	BKT	65	8%	16, 17	11
IV	Municipality	urban	middle	Thimi	85	10%	18, 19, 20	12
V	Municipality	urban	middle	Lalitpur	42	5%	21	13
					820	100%		

Note: BKT = Bhaktapur, KTM = Kathmandu, NGO = Non-Governmental Organization, DPHO = District Public Health Organization. ^{a)} refers to the area number given in Table 1. ^{b)} will be used during later analyses.

Table 4. Summary of Table 3, containing total number of households (N) and percentages (%).

Phase			Organization			Urbanization			Income			District		
N	%	Phase	N	%	Org.	N	%	Urban.	N	%	Income	N	%	District
259	32%	I	396	48%	NGO	247	30%	rural	118	14%	low	208	25%	KTM
198	24%	II	294	36%	Municipality	65	8%	peri-urban	312	38%	mixed	285	35%	Lalitpur
171	21%	III							390	48%	middle	173	21%	Thimi
150	18%	IV	130	16%	DPHO	508	62%	urban				154	19%	BKT
42	5%	V												
820	100%		820	100%		820	100%		820	100%		820	100%	

Note: BKT = Bhaktapur, KTM = Kathmandu, NGO = Non-Governmental Organization.

3.2 Demographics of the investigated communities

In the following, some selected demographic information is given (Table 5). In the text below, significant differences between areas are highlighted.

Table 5. Means and Standard Deviations of demographic indicators, calculated across all areas.

Demographic indicator	N ^{a)}	M	SD	Min	Max	p(ANOVA)
Age in years	819	36	14	12	85	0.003
Gender of the interviewed person (% women)	818	63%	-	-	-	0.000
Education in years	815	6.2	5.5	0	20	0.000
No. of rooms in which the family lives (without bathroom and small kitchen)	808	3.5	2.0	0	15	0.000
No. of persons per family	819	5.6	2.4	1	20	0.013
% of families with children below or equal to 5 years of age	819	33%	-	-	-	0.200
Socioeconomic status: calculated rooms/person	807	0.69	0.52	0	8	0.063

Note: SD = Standard deviation. M = mean, SD = standard deviation, Min = minimum, Max = maximum, p(ANOVA) = significance level (p) of an analysis of variance with post-hoc Bonferroni tests (ANOVA), which was

calculated to obtain significance levels between the 21 areas. ^{a)} = there is always some missing information, therefore N usually is somewhat below the total amount of 820 households.

Sundhara (Patan) has the highest mean age of the interviewed person (M=43; SD=12) and differs significantly (p=.048) from Gacche, which has the lowest mean age of the interviewed person (M=31; SD=10).

Pathivara has the highest amount of women interviewed (M=81%) and differs significantly from Bishnumati area (p=.043), where the lowest percentage of women was found (42%).

Interviewees in Pathivara and Sundhara had the lowest education level – they went to school only 3.6 years on average (SD=4.4). The highest level was found in Kopundole with 10.5 years (SD=5.6). Kopundole differs significantly from all areas with education levels below 6 years, which are Pathivara, Sundhara, Balkumari, Sipadol, Icchangu, Sankahamul, Tigani, Pacho/Chapacho, Bode and Dadikot (all p<.05). In addition, Gacche and Dallu Awas, the next most educated areas after Kopundole (M=8.6; SD=5.9), differ significantly from Pathivara and Sundhara (all p<.05).

Pathivara has the lowest amount of rooms per family (M=2.36; SD=0.92) and differs significantly from those areas with higher numbers of rooms per family which are Sankhadevi/Bisandul, Ilanani, Gahiti, Sirutar and Sundhara (all M>3.63; all p<.05).

According to the calculated socioeconomic status "rooms per person", Pathivara has the lowest socioeconomic status (M=0.50; SD=0.18) and differs significantly from the two areas with the highest socioeconomic status according to this measure, Gahiti and Sitapaila (M>0.94; p<.05).

Overall, Pathivara is a bit outstanding with the highest number of women interviewed, one of the lowest education levels of the interviewed person, lowest number of rooms per family, and also the lowest socioeconomic status according to how many people have to live in one room. Apart from Pathivara, there is no systematic relation between education and district, urbanization or income level, and the communities are considered to be of comparable demographic characteristics.

3.3 HWTS promotion strategies used by our Nepalese partners

The standard promotion strategy of ENPHO and its partners is to first give a TOT (Training of Trainers) to local promoters. The chosen promoters are active people, mostly of the target community, and experienced in WATSAN activities. After that, the promoters arranged group trainings in their communities and introduced people usually to all 4 HWTS options (boiling, filtration, chlorination and SODIS). Only one case is known, where no group training was conducted prior to the household visits (Sitapaila). In some cases, in addition to the group training, households were also trained directly, street dramas were performed, and schools were visited. As a follow up and monitoring strategy, households were visited one by one during the months after the group training.

The following descriptions and data are mainly from the interviews with the previous promoters. One promoter per area was interviewed, except in Icchangu, where we did not manage to meet one. Consequently, all numbers given in the following are based on 20 promoter interviews. The questions, of which means (M) and standard deviations (SD) are presented, required a rating on a 5 point scale ranging from 0 (negative answer) to 4 (very positive answer).

3.3.1 Training of the Trainers (TOT)

The TOT usually lasted around 1 to 3 days and was conducted by ENPHO. Only in case of the FCHVs (promoters of the DPHOs), the TOT was done locally during their monthly meeting. The TOT was liked a lot by all interviewed promoters (M=4, SD=0), they found it very interesting (M=4, SD=0) and learned enough about SODIS to be a good promoter (M=3.4, SD=0.8).

Overall, the TOT as currently realized by ENPHO is very much appreciated and can be recommended for future projects.

3.3.2 Group training

Group trainings were held with different target groups. Sometimes simply all households of the respective area were targeted, sometimes members of existing groups like women, saving or mothers groups were trained. Group size and duration of the training varied considerably across areas; on average the training lasted 1.5 hours (SD=0.8) and around 25 people (SD=15) attended one session. On average, 8 trainings (SD=7.5) per area were conducted by a mean of 3.8 promoters (SD=3.9) targeting in total between 20 and 600 households (M=180, SD=161) per area covering on average 44% (SD=33%) of the total households in each area. In around 30% of the areas, the HWTS topic was combined with other topics, for example, waste management or current topics of the women group. Additionally, in nearly all areas materials like pamphlets or brochures about HWTS options and in 2/3 of the areas also a mean of 2 bottles (SD=3) were distributed to the attending household members. Nevertheless, bottle scarcity was by 2/3 of all promoters judged to be a strong or very strong problem.

Summarizing, group trainings were conducted as a first mean of information transmission to the households, which is surely more time-efficient than addressing each household individually and can be further recommended. The combination with other topics seems to be an advantage, because it reflects the integration of the HWTS topic into ongoing programs. However, we found that high numbers of trainings and of trained households resulted in lower percentages of households now still using SODIS. It seems that promoters were less able to address people individually and convince them to use SODIS. Very noteworthy is the finding that providing bottles for free to the households resulted in lower percentages of users and higher percentages of relapse (many households stopped SODIS). This may be explained with the lacking necessity of households to integrate bottle supply into SODIS use from the beginning. Once the given bottles were damaged, people stopped preparing SODIS water.

3.3.3 Monitoring (= follow up)

After the group trainings, in all cases households were visited personally by the promoters to assure follow-up. This type of monitoring is often already part of the promoters' work; they simply integrate the new topic. Frequency and duration of the monitoring varied across areas. On average, households were visited 1.4 times per week (SD=1.4). Probably the frequency was only so high during the beginning of the project, but not during the entire project duration of on average 7.3 months

(SD=7.7). Each promoter was on average responsible for 74 households (SD=63). In 4 areas, SODIS is sometimes still a topic during household visits of the promoters.

In 70% of the cases, the promoters received some incentives or payment for at least a part of their work. The remaining 30% did not receive any incentives or payment. However, considering a workload of sometimes up to 80% (M=44, SD=18), those incentives were not perceived as adequate (M=1.2, SD=1.3; rating from 0=not adequate to 4=very adequate).

Summarizing, monitoring is certainly a good tool to support people's development of a new behavior. The longer the monitoring period, the higher was the sustained SODIS use. However, the frequency seems to be too high – the lower frequencies of monitoring finally achieved higher percentages of SODIS user and less relapse.

Lacking or inadequate incentives for the promoters are not only disagreeable for the promoters but also seem to result in lower motivation of the promoters. This in turn shows a direct correlation to lower SODIS use and more relapse. It is therefore recommended to increase the promoters' motivation by providing adequate incentives, depending on their workload. This does not necessarily imply monetary payments, also work certificates or some kind of public recognition would surely be appreciated.

3.3.4 Evaluation of the promotion strategy

The interviewed promoters judged the applied strategy as generally being very good (M=3.5, SD=1.9) and mostly the targeted people understood the application of SODIS easily (M=3.75, SD=0.9). However, sometimes it was not so easy to convince people of SODIS (M=1.9, SD=1.5) and people also did not always like the promotion project (M=2.6, SD=2.0). The promoters reported that with the proof of water tests, convincing people became easier. Sometimes the promotion strategy was not liked very much, because the monitoring was perceived as repetitious.

The promoters estimated on average that after the promotion phase quite a lot of people started SODIS use (M=61% of the trained people, SD=28), whereas current SODIS use (at the time of the interview) was estimated to be only around 22% (SD=21). Both estimations seem to be quite accurate according to the data we collected from the households. According to their own statements, 70% had started SODIS at some point after the promotion phase and currently 21% used SODIS at least irregularly.

60% of the promoters stated they liked the project work very much, the other 40% at least liked it a little, but 1 FCHV actually disliked it very much because she felt she would have had better things to do at home (M=2.7, SD=2.2). Quite strongly positively related to liking or not liking the project was how well the promoters felt supported by their organization (M=1.8, SD=1.9; $r=.55$, $p=.017$) and if the project in general was perceived as successful (M=2.4, SD=1.7; $r=.78$, $p<.001$). Organizational support in terms of knowledge and consultancy backup (M=1.8, SD=1.9) and overall project success (M=2.4, SD=1.7) were rated rather moderately.

Summarizing, the promotion strategy (training + monitoring) seems to be accepted and liked by both, the households and the promoters, and should be continued. If possible, one water test for each area should be provided to easier convince people. Additionally, we see some improvement potential for motivating the promoters with a better organizational support. Also, realistic expectations should be communicated regarding which user rate can be achieved and that it is quite

normal that user rates drop after a while. Unrealistic expectations may have led to the moderate rating of the overall project success.

3.3.5 Problems and reasons for non-use of SODIS

Given in the order of how frequently they were mentioned, main problems and reasons for non-use of SODIS were behavior related (people said they were busy or too lazy), people did not have interest or no belief in the SODIS method, lack of bottles, other HWTS options were preferred, no sunny space for the bottles, water is judged to be clean, and season.

Suggestions for improvement included the need for more communication from ENPHO after project end like refresher trainings for the promoters, the need for longer monitoring periods as well as bottle supply, and higher economic incentives for motivating the promoters.

3.3.6 Characteristics of the promoters

Each type of implementing organization used a different type of promoters. Local NGOs mostly used lowly paid volunteers or their own paid staff and targeted all households of a certain community. The municipalities very often worked with women or mothers groups, and often chose one woman of each group to be the promoter of her respective group. But also city volunteers (CV; young, unpaid students before university) and volunteer health promoters (THP) came to use by municipalities. The promoter-network of the District Public Health Offices (DPHO) consists of Female Community Health Volunteers (FCHV), which promoted SODIS/HWTS in addition to their ongoing topics.

50% of the promoters were of young age and mostly male, 50% middle aged and older and mostly female. Mainly the younger male promoters reported difficulties of being accepted by the (mostly older) women which they had to train on HWTS. All but one of the promoters lived in the community where they realized the promotion activities and 70% used SODIS themselves. Knowledge on how to prepare SODIS was good on average ($M=3.3$, $SD=0.8$), only shaking the bottles was sometimes still mentioned to be necessary although it was abandoned already some years ago. Knowledge on why SODIS disinfects the water was less well developed ($M=2.5$, $SD=1.5$). Confidence of the promoters that SODIS reliably kills all the microbes was very high ($M=3.7$, $SD=0.8$) and the importance of water among the health topic was also rated very high ($M=3.8$, $SD=0.4$).

It seems that older female promoters are more accepted, because they correspond to the target group. This should be taken into account when selecting promoters, and maybe a young one should work in a team with an older one. Furthermore, during the TOT some more attention should be paid to the promoters' understanding of why SODIS is an effective household water treatment method.

4 Water consumption pattern

In this section, an overview is given about which types of water people consume, which combinations of different consumed water types exist, and what are the proportions of the different consumed water types. In a second part, the water consumption pattern is related to the demographic indicators, as well as situational variables like promotion phase, income and urbanization level, implementing organization and district.

4.1 Description of water consumption

Out of 820 households, 46% stated to have consumed untreated water during the last 2 weeks, 43% have consumed filtered water, 21% SODIS water, 12% boiled water for water treatment (this percentage excludes boiling for hot beverages), 7% consumed bought water, 4% chlorinated (parts of) their water, and 2% applied some treatment combination (mostly boiling plus filter).

These percentages, because they add up to more than 100%, imply that a considerable amount of households consume not only one water type (see Figure 1). A detailed list of all combinations is given in Table 6.

Figure 1. Water consumption pattern. Proportions of households (N=820) only consuming one water type and proportions of households consuming two or more water types are given.

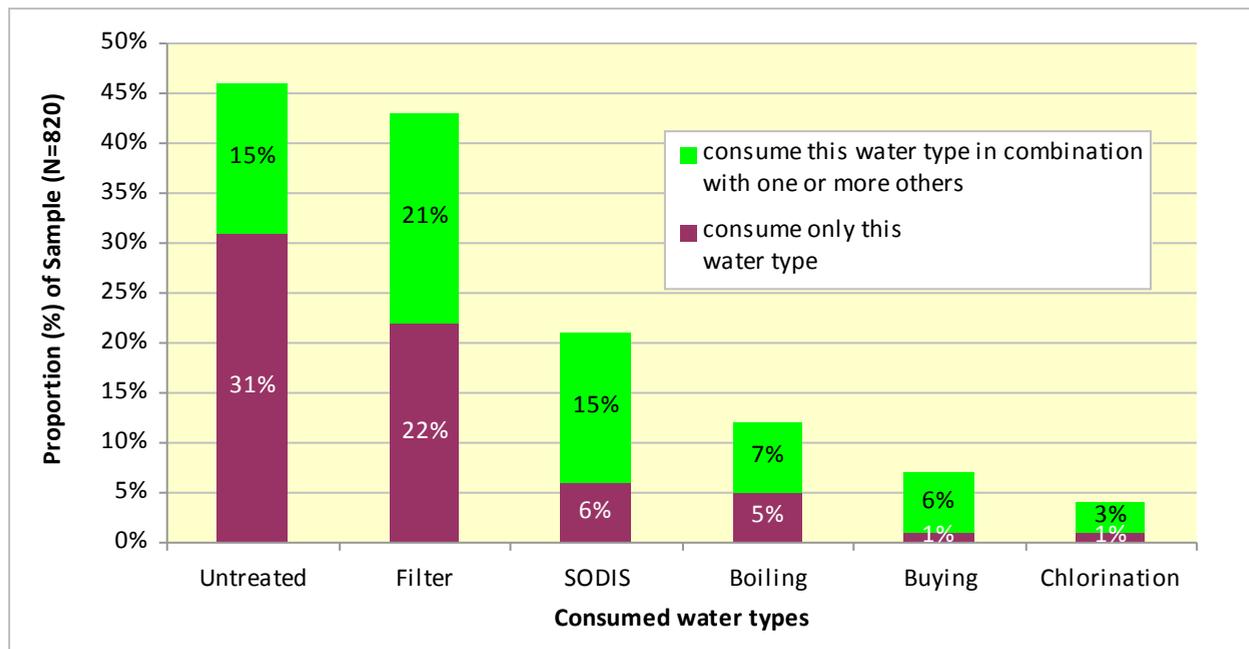


Table 6. Water consumption pattern. Number of households (N) and percentages (%) of total N are given.

Consumed water types last 2 weeks (% yes)	N	%	Proportions of different water types (100% = amount of total daily water consumption)
Untreated	247	31%	94% untreated water; 6% coffee or tea
Filter	172	22%	90% filtered water; 10% coffee or tea
SODIS & Filter	63	8%	27% SODIS water; 64% filtered water; 9% coffee or tea
SODIS	48	6%	94% SODIS water; 6% coffee or tea
Boiled	39	5%	100% boiled water, including coffee or tea
SODIS & Untreated	38	5%	34% SODIS water; 59% untreated water; 7% coffee or tea
Filter & Untreated	32	4%	46% filtered water; 48% untreated water; 6% coffee or tea
Filter & Boiled	24	3%	51% boiled water, including coffee or tea; 49% filtered water
Boiled & Untreated	11	1%	N too low for calculation
SODIS & Boiled	10	1%	
SODIS & Filter & Untreated	10	1%	
Filter & Bought & Untreated	8	1%	
Chlorine & Filter	8	1%	
SODIS & Filter & Bought	8	1%	
Other	8	1%	
Bought	7	1%	
Chlorine	7	1%	
SODIS & Chlorine	7	1%	
Bought & Untreated	6	1%	
Filter & Bought	5	1%	
SODIS & Bought	5	1%	
Other combinations, each N<5	32	4%	
	795	100%	

Note: N = number of households. N does not sum up to the total of 820 households due to missing information of 25 households.

Out of the 46% consuming untreated water, two thirds (31% of the population) consume entirely untreated water (apart from the small part of water that is boiled for hot beverages), and one third (15%) consumes untreated water combined with another type of water (SODIS 5%, filter 4%, others each $\leq 1\%$). In contrast, only half of the ones who use a filter (22%) consume only filtered water, the other half (21%) consumes another water type apart from filtered water (SODIS 8%, untreated 4%, boiled 3%, others each $\leq 1\%$). Among the SODIS users, only one fourth exclusively consumes SODIS water, three fourth combine it with another water type (filter 8%, untreated 5%, others each $\leq 1\%$). For boiling, the picture is similar – only 5% out of 12% (approx. 40%) consume exclusively boiled water, the rest mixes (filter 3%, others each $\leq 1\%$). The same applies for buying water and chlorinating water, but here overall percentages of people consuming these water types are low already.

Summarizing, 31% drink only untreated water (N=247), 15% drink untreated water in addition to treated water (N=118), 35% use only one water treatment option (or a combination) for all their water (N=281), and 19% use 2 or more different water treatment options (or a combination) for all their water (N=149). Consequently, we can define $35+19=54\%$ as complete safe water consumers (SWC) and $31+15=46\%$ as unsafe water consumers (UWC).

Interestingly, if treated water is consumed, more than 50% consume a combination of water types instead of only one. One quite popular combination seems to be the one of filtered and SODIS water. People may use SODIS at times of appropriate weather conditions and otherwise – or if they run out

of SODIS water – consume filtered water. In contrast, if people consume untreated water, it seems less common to combine it with one of the treatment options. Only one third of the untreated water consumers consume it in combination with a treated water type.

As an additional information, correlations between the amounts of the different consumed water types show that all are related negatively to each other (Table 7). This is logical, since consuming more of one water type means consuming less of another. Most importantly, the amount of untreated water is negatively related to each of the treated water amounts. That means, no matter which water treatment method gets applied, in the end less untreated water is consumed. The strongest relation was found for filtered water ($r=-.60$), followed by boiled water ($r=-.32$) and SODIS water ($r=-.29$). The full correlation matrix can be found in Table 7.

Table 7. Correlation matrix of the proportions of all consumed water types (N=790).

Water type	Mean	SD	Untreated	SODIS	Filtered	Boiled	Chlorinated
Untreated	36.8	43.8	-				
SODIS	11.2	26.1	-0.291***				
Filtered	30.6	39.6	-0.599***	-0.219***			
Boiled	15.7	25.4	-0.324***	-0.128***	-0.161***		
Chlorinated	2.0	11.9	-0.126***	-0.045	-0.091*	-0.045	
Bought	2.2	11.9	-0.139***	-0.032	-0.111**	-0.008	-0.024

Note: Means and SD are given as the proportion (%) of the total water consumption. SD = Standard deviation. Significant correlation coefficients are marked (*** = $p<.001$, ** = $p<.01$, * $p<.05$).

The table also shows the average proportions of consumed water types. In the entire investigated sample, 37% of the consumed water is untreated, 31% is filtered, 16% is boiled, 11% is treated with SODIS, and each 2% are chlorinated or bought water. It seems that filtering is the most popular water treatment option, followed by boiling (however, boiled water proportion also includes the amounts of water that are boiled for hot beverages). SODIS seems then to be the next preference for water treatment, whereas chlorinating and buying water are not very common.

4.2 Safe water consumption related to demographic indicators

Often, safe water consumption (SWC) is suspected to be related to demographic indicators. Here, the relation to the age of the interviewed person, his/her education level, number of rooms per family, number of total people living in one family, if the family has children below 5 years of age, and the socioeconomic status (rooms/person) were investigated.

Table 8 shows that only for education there is a notable difference between UWC and SWC – SWC have a higher education level than UWC ($p<.001$). Accordingly, also in the logistic regression including all demographic indicators, only education turns out to be a significant predictor of SWC (OR=1.06 per year of education, $p<.001$). So, a higher education level increases the chance of being a SWC.

Table 8. Odds ratios for safe water consumers (SWC; N=430) compared to untreated water consumers (UWC; N=371) regarding various demographic indicators.

Variable	UWC	SWC	OR	Lower C.I.	Upper C.I.	p
Age in years	36	36	1.01	1.00	1.02	0.059
Education in years	5.40	6.88	1.06	1.03	1.09	0.000
Number of rooms in which the family lives (without bathroom and small kitchen)	3.46	3.61	1.09	0.96	1.23	0.190
Number of persons per family	5.69	5.57	0.93	0.85	1.01	0.093
% of families with children below or equal to 5 years of age	32%	35%	1.20	0.88	1.63	0.257
Socioeconomic status: calculated rooms/person	0.68	0.71	0.76	0.48	1.22	0.255

Note: UWC = Unsafe water consumers, SWC = Safe water consumers, OR = Odds ratio (significant OR at $p < .05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample knowing SODIS (N=801 due to listwise deletion of missing values); a constant was included in the models. Explained variance of the dependent variable is 3.5% (Nagelkerke).

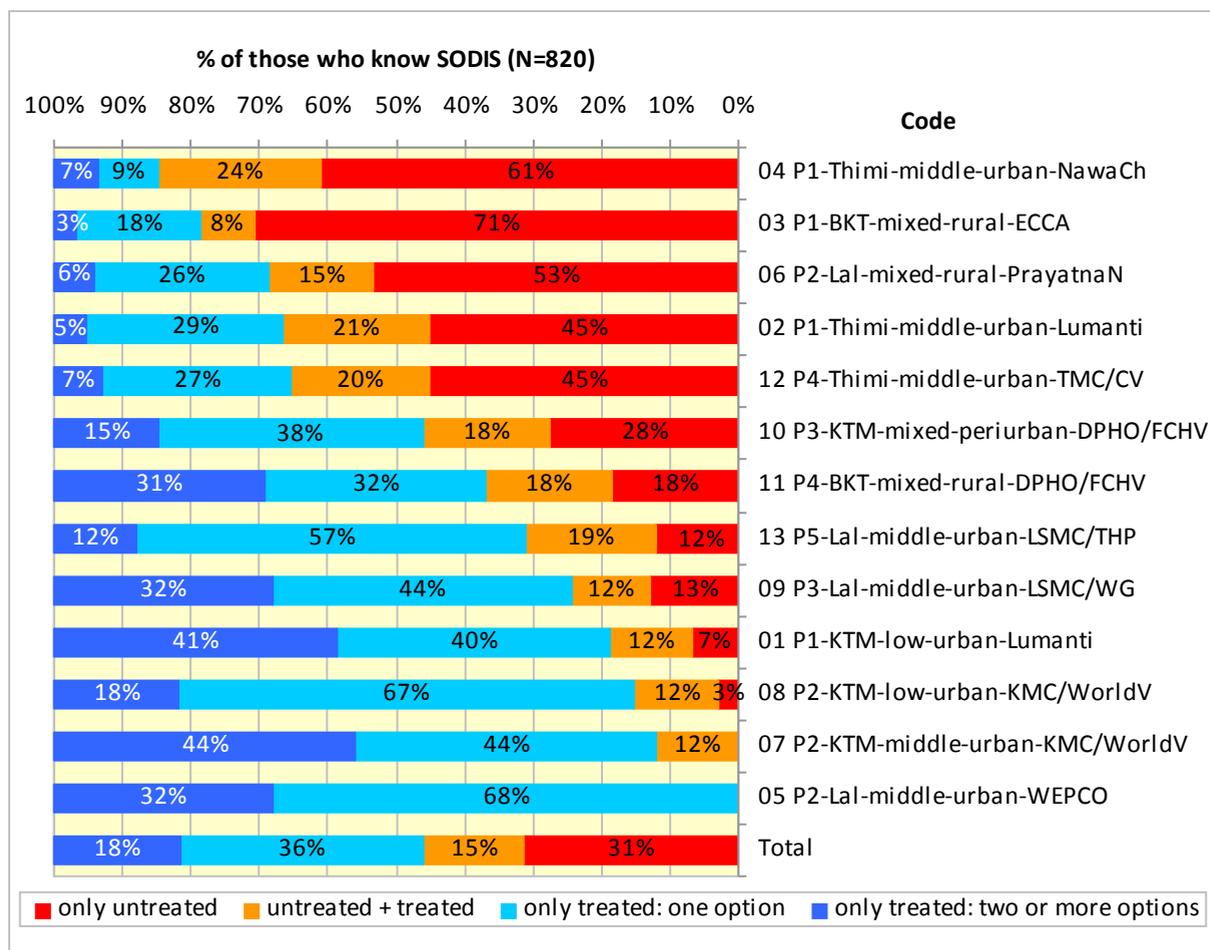
Only the education level increases the chance of being a SWC, the other demographic indicators – age, number of rooms per family, number of total people living in one family, if the family has children below 5 years of age, and the socioeconomic status (rooms/person) – do not have an impact of SWC.

4.3 Safe water consumption in different investigated areas

If splitting up water consumption across the different investigated areas, we find the following pattern (Figure 2). The 21 areas are clustered into 13 categories (Code) according to the criteria promotion phase, implementing organization, urbanization and income level (see above, Table 3).

Figure 2 shows a wide range of percentages of SWC – from only 16% in the Phase 1 areas of urban middle class Thimi with promotion by the NGO Nawa Chatrodaya up to 100% in the Phase 2 areas of urban middle class Lalitpur, also with NGO promotion (WEPCO). In general, the districts of Thimi and Bhaktapur range rather at the top end of the figure, signifying lower percentages of SWC (almost all <50%). The districts of Lalitpur and Kathmandu show in general higher percentages of SWC (all >50%), and consequently lower percentages of UWC (see comparisons 7-10 below). One exception is the rural area of Lalitpur, which also shows quite low SWC percentages. The 5 promotion phases are not found to appear in a particular order, suggesting that there seems to be no systematic influence of later promotion phases on higher proportions of SWC, as one would have expected (see comparison 4 below). Although governmental promotion (municipality and DPHO) seems to always have resulted in quite high SWC percentages (except Thimi Municipality), there is a strong confound with the degree of urbanization – which is also related to the district – and with this the income level. Urban areas were only investigated in the districts of Kathmandu, Lalitpur and Thimi being of low or middle income, whereas rural areas were only investigated in the districts of Bhaktapur and Lalitpur being all of mixed income level. In addition, municipalities only work in urban, DPHOs only in rural and periurban areas. Consequently, these two governmental organizations cannot be compared directly.

Figure 2. Distribution of safe water consumers (one and two or more options; SWC) and unsafe water consumers (only untreated and untreated + treated water; UWC) across area clusters.



Note: BKT = Bhaktapur, CV = City Volunteer, DPHO = District Public Health Office (Ministry of Health), ECCA = Environmental Camps for Conservation Awareness (NGO), FCHV = Female Community Health Volunteer (Ministry of Health), KMC = Kathmandu Metropolitan City (Municipality), KTM = Kathmandu, LSMC = Lalitpur Sub-Metropolitan City (Municipality), Lal = Lalitpur, NawaCh = Nawa Chatrodaya (NGO), NGO = Non-Governmental Organization, PrayatnaN = Prayatna Nepal (NGO), TMC = Thimi Metropolitan City (Municipality), THP = Tole Health Promoter, WEPCO = Women Environment Preservation Committee (NGO), WG = Women Group.

The area cluster with the lowest percentage of SWC is at the top (Code 04), the area cluster with the highest percentage of SWC can be found at the bottom of the figure (Code 05).

Example of the interpretation of "Code": "01 P1-KTM-low-urban-Lumanti": 01 = Code, P1 = SODIS/HWTS promotion phase, low = income status, urban = level of urbanization, Lumanti = organization which implemented the SODIS/HWTS promotion. For all details, see above Table 2 and Table 3.

Some of the single effects may be better shown when comparing two areas directly with each other regarding one single variable while all the other criteria are the same. The following comparisons can be made:

- 1. Comparison of 2 NGOs:** Comparing Codes 04 and 02, two different NGOs, Nawa Chatrodaya and Lumanti, which worked under similar conditions (urban Thimi, middle income, Phase 1) can be compared with each other. Nawa Chatrodaya achieved lower SWC percentages (16%) than Lumanti (34%; $p < .05$) during one year of SODIS promotion.

2. **Comparison NGO – municipality:** Now comparing the better one of the NGOs (NGO Lumanti; Code 02) with the Thimi Municipality (TMC; Code 12), both achieved the same percentages of SWC (34%), although TMC promoted SODIS/HWTS 3 years later than Lumanti. So in Thimi, the municipality can be viewed as equally or even less effective than the NGO Lumanti.
3. **Comparison NGO – municipality:** Two more comparisons NGO vs. municipality can be found. First, when looking at Codes 05 and 07. Both, WEPCO and Kathmandu Municipality (KMC), worked in urban middle income areas during Phase 2 (in Lalitpur and Kathmandu district; however, urban Kathmandu and Lalitpur are viewed as quite similar). WEPCO achieved 100% SWC, KMC 88% ($p < .05$). Although the difference is significant, both percentages of SWC are very high. Second, when looking at Codes 01 and 08. Again these are areas located in the Kathmandu district, but this time with low income. Promotion took place during phases 1 (NGO Lumanti) and 2 (KMC). SWC percentages are 81% (NGO) and 85% (KMC), respectively ($p = n.s.$).
4. **Comparing different promotion phases:** Trying to disentangle effects of each of the different promotion phases, we face the almost impossible. This is due to the fact that earlier promotion was realized all by NGOs and later all by municipalities and DPHOs. However, two comparisons can be made. One, under the assumption that urban Lalitpur and Kathmandu are very similar, comparing Codes 07 and 13. In both areas, the municipality realized promotion activities in middle income urban areas, one was during Phase 2 (Kathmandu), the other during Phase 5 (Lalitpur). In Phase 2, 88% SWC and in Phase 5 69% SWC were achieved ($p < .1$). So, the percentage in Phase 5 was even lower than the one of Phase 2 (although only tendentially significant), which may be the different year of promotion or a district effect (also, Lalitpur and Kathmandu of course have different municipalities). The second comparison, Codes 09 and 13, is between phases 3 and 5. Here Lalitpur municipality (LSMC) promoted SODIS/HWTS in urban middle income areas. SWC percentages are 76% and 69%, respectively ($p = n.s.$). So, again no phase effect could be found.
5. **Comparison NGO – DPHO:** Looking at Codes 03 and 11, a comparison between an NGO (ECCA) and a District Public Health Organization (DPHO) can be found. Both worked in rural Bhaktapur mixed income areas. However, ECCAs promotion took place in Phase 1 and the DPHO promotion in Phase 4. ECCA achieved 21% SWC, whereas the DPHO convinced 63% ($p < .001$). This may be a matter of the higher effectiveness of the DPHO or a matter of time (ECCA promotion was 4 years earlier). However, as shown above, the time effect is very unlikely to be so large (if it even exists), so this one comparison suggests a higher effectiveness of DPHOs in rural areas compared to an NGO.
6. **Comparison low – middle income:** Also, some information of the influence of low vs. middle income groups can be found; however, only in urban areas. A comparison of Codes 01 and 05 shows 81% and 100% SWC, respectively ($p < .01$). In both areas the promotion was carried out by an NGO (Lumanti and WEPCO, respectively) and during phases 1 and 2, respectively. Although the difference is significant, low and middle income people show high percentages of SWC. Another comparison of Codes 07 and 08 points into the same direction. 85% SWC for the low income area and 88% SWC for the middle income area were found ($p = n.s.$). Here promotion took place in Phase 2 by KMC.

Finally, the district and rural/urban effect must not be overlooked.

7. **Comparison urban Thimi – urban Kathmandu:** When looking at exactly the same promoting NGO (Lumanti) in a comparison of Codes 01 and 02, the difference between Thimi and Kathmandu is huge. In Thimi, Lumanti achieved 34% SWC and in Kathmandu 81% ($p < .001$).
8. **Comparison urban Thimi – urban Lalitpur:** First, a comparison between Thimi and Lalitpur can be made looking at Codes 02, 04 (both Thimi) and 05 (Lalitpur). Promotion had taken place in urban middle income areas during phases 1 (Thimi) and 2 (Lalitpur), promoting organizations were NGOs (Nawa Chatrodya, Lumanti (both Thimi), and WEPCO (Lalitpur)). Already, we found a

difference between Nawa Chatrodaya and Lumanti (see comparison 1), but the difference to Lalitpur is enormous. SWC percentages are 16%, 34% and 100% ($p < .001$ between Thimi (Lumanti) and Lalitpur). Similar differences are found when comparing Codes 12 and 13. Promotion in these urban middle income areas was during phases 4 (Thimi) and 5 (Lalitpur) by the municipalities. In Thimi, 35% are SWC, in Lalitpur 69% ($p < .001$).

9. **Comparison urban Kathmandu – urban Lalitpur:** Also, Kathmandu and Lalitpur can be compared directly, looking at Codes 07 and 09. Promotion took place during phases 2 (Kathmandu) and 4 (Lalitpur) by the municipalities in urban middle income areas. In Kathmandu, 88% SWC and in Lalitpur 76% SWC are found ($p = n.s.$). So, urban Kathmandu and urban Lalitpur indeed seem to be very similar with regards to SWC as it was assumed earlier (comparison 3 and 4).
10. **Comparison rural Bhaktapur – rural Lalitpur:** Furthermore, rural areas in two different districts can be compared, looking at Codes 03 and 06. In Bhaktapur and Lalitpur, an NGO promoted SODIS/HWTS in mixed income rural areas during phases 1 and 2, respectively. In Bhaktapur, 21% and in Lalitpur 32% SWC are found ($p = n.s.$). So, Bhaktapur and Lalitpur rural areas seem to be as similar as Kathmandu and Lalitpur urban areas.

Since the districts are closely connected to the characteristics rural or urban, one could also leave away the district effect and only look at urban vs. rural effects (but excluding Thimi, and under the assumption that income does not play a role).

11. **Comparison rural – urban areas:** Rural areas in Bhaktapur compared with urban areas in Kathmandu (Codes 03 and 01), both NGO promotion during phase 1, reveal much lower SWC percentages for the rural areas (21%) compared to the urban ones (82%; $p < .001$). The same can be found when comparing Codes 06 and 05 (NGO promotion, phase 2, both Lalitpur district). The rural area has much lower SWC percentages (32%) than the urban one (SWC=100%, $p < .001$). So SODIS/HWTS promotion in rural areas seems to be a lot less effective than in urban areas. However, the one rural area in Bhaktapur which had DPHO promotion (Code 11; SWC=63%) gets fairly close to SWC percentages of urban areas in Lalitpur and Kathmandu (SWC between 69% and 100%). So here the DPHO seems to have made the difference, as it was already pointed out in comparison 5.

Summarizing, in achieving high percentages of SWC, NGOs and municipalities in urban areas are equally effective, independently of the district, whereas DPHO promotion seems to be much more effective (two times higher SWC percentage) than NGO promotion in rural areas. The reason is probably the stronger network of the DPHO compared to an NGO, which is more advantageous in spacious areas. However, the degree of success can also vary considerably between different NGOs.

Interestingly, the promotion phase seems to have no influence on percentages of SWC. Neither does the income level, because no difference can be found between low and middle income groups in urban areas.

Regarding the different investigated districts, the urban areas of Lalitpur and Kathmandu are very similar, as these two cities are directly next to each other and often appear as one city. However, the urban areas of Thimi are very distinct to the urban areas of Kathmandu and Lalitpur, as Thimi is a much smaller town. SWC percentages in Thimi reach only a third to a half of the ones of Kathmandu and Lalitpur. One reason seems to be the water treatment plant, which was built a few years ago near Thimi, and which makes people believe their water is clean for consumption. This may or may not be true, depending on the quality of the supply system (pipes).

The rural areas of Bhaktapur and Lalitpur are also very similar regarding safe water consumption. In general, the investigated urban areas see around two times higher percentages of SWC than rural areas. One explanation may be the often mentioned perception of the water quality as being good in

the investigated rural areas compared to a more critical perception of water quality in the investigated urban areas. Also, in some rural areas the accessibility of resources to obtain safe water (e.g. bottles, filter, chlorine) may be a problem.

5 SODIS water consumption

In this section, more details are singled out on the regularity of SODIS use and the proportion of SODIS treated water in the different areas. SODIS water consumption is related first to demographic indicators and then to the situational variables promotion phase, income and urbanization level, implementing organization and district.

Moreover, promotion campaign influences on SODIS use and SWC are examined, as well as reasons given by the people why SODIS use was started and often stopped again.

5.1 Description of SODIS water consumption

21% (N=173) stated to have consumed SODIS water during the last 2 weeks. Out of these 173 households, 65% stated to be regular SODIS users (almost daily SODIS water consumption), treating on average 67% of their water with SODIS. The remaining 35% who had stated to have consumed SODIS water during the last 2 weeks are irregular users who treat on average only 32% of their water with SODIS and consume it only during 3.8 days per week. In addition, 46 households stated to use SODIS irregularly according to season. Of the total sample knowing SODIS, we found 14% regular SODIS user and 13% irregular SODIS user. Only 19% of regular SODIS users consume untreated water compared to 35% of the irregular SODIS users. Table 9 shows a summary.

Table 9. Definition of SODIS user status.

SODIS user status	regular	irregular type 1	irregular type 2
SODIS last 2 weeks	yes	yes	no
Proportion of SODIS treated water (currently)	67%	32%	0%
Days per week SODIS water (currently) [M(SD)]	6.6 (1.2)	3.8 (1.9)	0
Untreated water last 2 weeks (% yes)	19%	34%	36%
Combination with other HWTS option(s)	42% ^{a)}	75% ^{b)}	87% ^{c)}
Number of households (N)	112	61	46
% of those who know SODIS (N=820)	14%	7%	6%

Note: M = calculated average (mean), SD = standard deviation.

^{a)} Out of these 42% (N=47): 76% filter, 16% boil, 16% buy, and 9% chlorinate their water in addition to SODIS.

^{b)} Out of these 72% (N=46): 72% filter, 9% boil, 15% buy, and 13% chlorinate their water in addition to SODIS.

^{c)} Out of these 87% (N=40): 72% filter, 23% boil, 21% buy, and 10% chlorinate their water.

14% of the sample use SODIS regularly, 7% irregularly, i.e. not every day and 6% irregularly, i.e. only during the summer season. Irregular SODIS users are almost twice as likely to consume untreated water compared to regular SODIS users, and they are also around twice as likely as regular users to combine SODIS with another water treatment option.

5.2 SODIS water consumption related to demographic indicators

As for safe water consumption, also for SODIS use the relation to different demographic indicators is explored. Namely, the age of the interviewed person, his/her education level, number of rooms per family, number of total people living in one family, if the family has children below 5 years of age, and the socioeconomic status (rooms/person) were investigated.

Table 10 clearly shows that none of the demographic indicators shows a relation to SODIS use.

Table 10. Odds ratios for SODIS non-user (N=588) and user (N=215) regarding various demographic indicators.

Variable	SODIS non-user	SODIS user	OR	Lower C.I.	Upper C.I.	p
Age in years	36	37	1.01	0.99	1.02	0.242
Education in years	6.05	6.59	1.02	0.99	1.06	0.153
Number of rooms in which the family lives (without bathroom and small kitchen)	3.49	3.67	1.09	0.95	1.25	0.238
Number of persons per family	5.67	5.48	0.93	0.84	1.03	0.163
% of families with children below or equal to 5 years of age	33%	33%	1.07	0.76	1.51	0.697
Socioeconomic status: calculated rooms/person	0.68	0.73	0.87	0.52	1.46	0.598

Note: OR = Odds ratio, C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample knowing SODIS (N=803 due to listwise deletion of missing values); a constant was included in the models. Explained variance of the dependent variable is 1.1% (Nagelkerke).

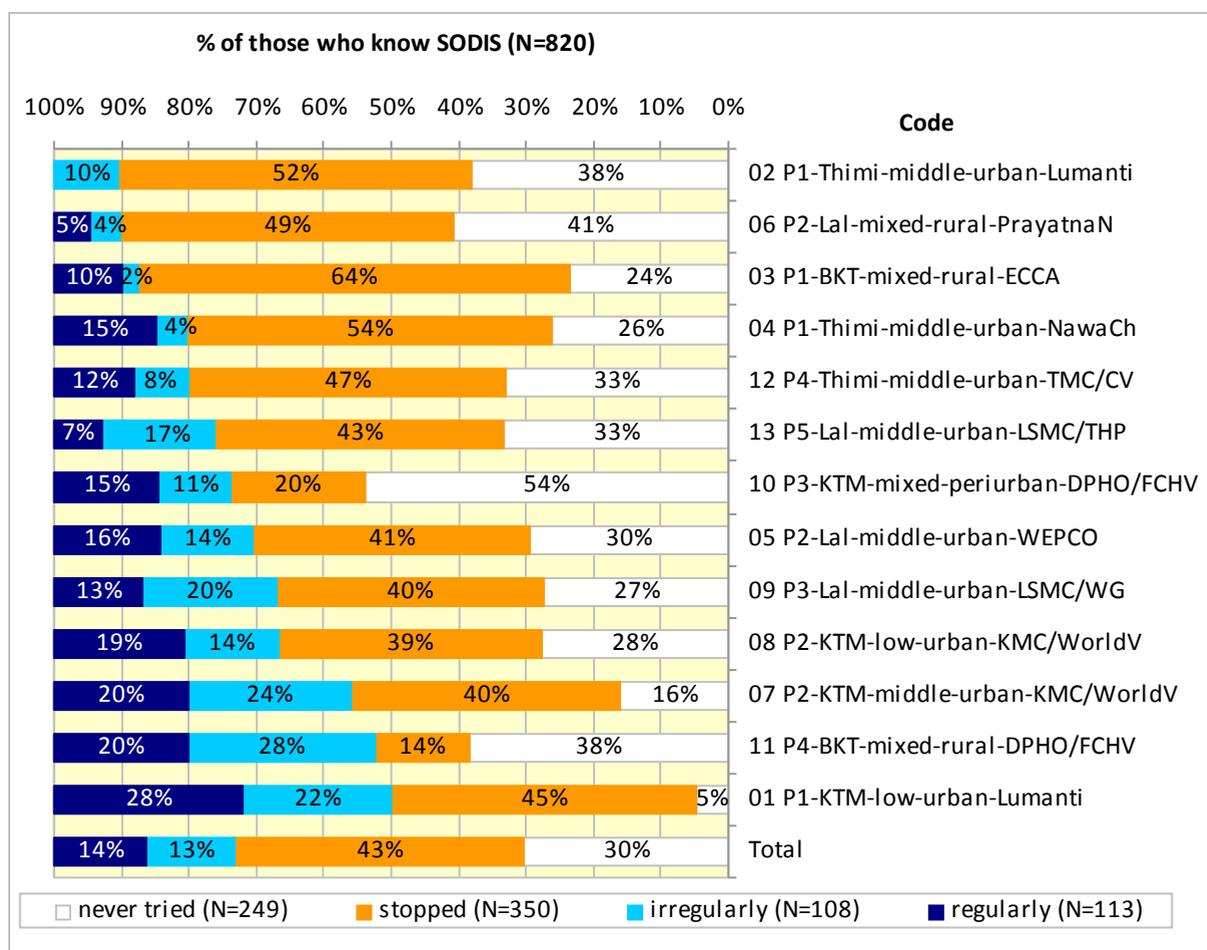
5.3 SODIS water consumption in different investigated areas

Figure 3 gives more details on the distribution of regular and irregular SODIS users, relapsers (those who stopped SODIS use), and those who never tried out SODIS across the different areas. The 21 areas are clustered into 13 categories according to the criteria promotion phase, implementing organization, urbanization and income level (see above, Table 3).

Figure 3 shows a wide range of percentages of SODIS users – from only 10% in the Phase 1 areas of urban middle class Thimi with promotion by the NGO Lumanti to 50% in other Phase 1 areas of urban middle class Kathmandu, also with Lumanti promotion. In general – as it was already observed for percentages of SWC – the districts of Thimi and Bhaktapur range at the top end of the figure, signifying lower percentages of SODIS users (almost all <25%). The districts of Lalitpur and Kathmandu show in general higher percentages of SODIS users (all >25%), and consequently lower

percentages of SODIS non-users). One exception is the rural area of Lalitpur, which also shows quite low SODIS user percentages. As for SWC, the 5 promotion phases are not found to appear in a particular order, indicating that there seems to be no systematic influence of later promotion phases on higher proportions of SODIS users. Although governmental promotion seems to always have resulted in higher SODIS user percentages (except Thimi Municipality), again conclusions cannot be drawn as simply, because there is a strong confound with the degree of urbanization – which is also related to the district – and with this the income level. Rather, single comparisons are realized to disentangle the different influences of phase, income, implementing organization, district, and degree of urbanization.

Figure 3. Distribution of SODIS users (irregular and regular users) and non-users (relapsers and never tried) across area clusters.



Note: BKT = Bhaktapur, CV = City Volunteer, DPHO = District Public Health Office (Ministry of Health), ECCA = Environmental Camps for Conservation Awareness (NGO), FCHV = Female Community Health Volunteer (Ministry of Health), KMC = Kathmandu Metropolitan City (Municipality), KTM = Kathmandu, LSMC = Lalitpur Sub-Metropolitan City (Municipality), Lal = Lalitpur, NawaCh = Nawa Chatrodaya (NGO), NGO = Non-Governmental Organization, PrayatnaN = Prayatna Nepal (NGO), TMC = Thimi Metropolitan City (Municipality), THP = Tole Health Promoter, WEPCO = Women Environment Preservation Committee (NGO), WG = Women Group.

The area cluster with the lowest percentage of SODIS users is at the top (Code 02), the area cluster with the highest percentage of SODIS users can be found at the bottom of the figure (Code 01).

Example of the interpretation of "Code": "01 P1-KTM-low-urban-Lumanti": 01 = Code, P1 = SODIS/HWTS promotion phase, low = income status, urban = level of urbanization, Lumanti = organization which implemented the SODIS/HWTS promotion. For all details, see above Table 2 and Table 3.

As for the analysis SWC vs. UWC, also the single effects of certain variables on SODIS use may be better shown when comparing two areas directly with each other regarding one variable while all the other criteria are the same. The same comparisons as for SWC can be made:

1. **Comparison of 2 NGOs:** Comparing Codes 04 and 02, two different NGOs, Nawa Chatrodaya and Lumanti, which worked under same conditions (urban Thimi, middle income, Phase 1) can be compared with each other. Nawa Chatrodaya and Lumanti achieved similar SODIS-user percentages (19% and 10%, respectively, $p=n.s.$). However, Nawa Chatrodaya made 15% to be regular SODIS user, whereas 0% in the Lumanti area stated to be regular user ($p<.01$).
2. **Comparison NGO – municipality:** Now comparing the better one of the NGOs (Code 04) with Code 12 (NGO Nawa Chatrodaya vs. Thimi Municipality (TMC)), both achieved the same percentages of SODIS-users (19% and 20%, respectively, $p=n.s.$), although TMC promoted SODIS/HWTS 3 years later than Lumanti. So in Thimi, the municipality can be viewed as equally or even less effective than the NGO Nawa Chatrodaya.
3. **Comparison NGO – municipality:** Two more comparisons NGO vs. municipality can be found. First, when looking at Codes 05 and 07. Both, WEPCO and Kathmandu Municipality (KMC), worked in Kathmandu and Lalitpur urban middle income areas during Phase 2. WEPCO achieved 30% SODIS-user, KMC 44% ($p=n.s.$). However, the difference is not significant due to small sample sizes. Second, when looking at Codes 01 and 08. Both areas are located in the Kathmandu district, but this time with low income. Promotion took place during phases 1 (NGO Lumanti) and 2 (KMC). SODIS-user percentages are 50% (NGO) and 33% (KMC), respectively ($p<.1$). So, the tendency of the result is balanced – in the middle income area the municipality was better, in the low income area the NGO achieved better results.
4. **Comparing different promotion phases:** Trying to disentangle effects of each of the different promotion phases, we face the almost impossible. This is due to the fact that earlier promotion was realized all by NGOs and later all by municipalities and DPHOs. However, two comparisons can be made. One, under the assumption that urban Lalitpur and Kathmandu are very similar districts, comparing Codes 07 and 13. In both areas, the municipality realized promotion activities in middle income urban areas, one was during Phase 2 (Kathmandu), the other during Phase 5 (Lalitpur). In Phase 2, 44% SODIS-user and in Phase 5, 24% SODIS-user were achieved ($p<.1$). So, the percentage in Phase 5 was even lower than the one of Phase 2 (although only tendentially significant), which may be the different year of promotion or a district effect (also, Lalitpur and Kathmandu of course have different municipalities). The second comparison, Codes 09 and 13, is between phases 3 and 5. Here Lalitpur municipality (LSMC) promoted SODIS/HWTS in urban middle income areas. SODIS-user percentages are 33% and 24%, respectively ($p=n.s.$). So, again no phase effect could be found.
5. **Comparison NGO – DPHO:** Looking at Codes 03 and 11, a comparison between an NGO (ECCA) and a District Public Health Organization (DPHO) can be found. Both worked in rural Bhaktapur mixed income areas. However, ECCAs promotion took place in Phase 1 and the DPHO promotion in Phase 4. ECCA achieved 12% SODIS-user, whereas the DPHO convinced 48% ($p<.001$). This may be a matter of the higher effectiveness of the DPHO or a matter of time (ECCA promotion was 4 years earlier). However, as shown above, the time effect is very unlikely to be so large (if it even exists), so this one comparison suggests a higher effectiveness of DPHOs in rural areas compared to an NGO.
6. **Comparison low – middle income:** Also, some information of the influence of low vs. middle income groups can be found; however, only in urban areas. A comparison of Codes 01 (low income) and 05 (middle income) shows 50% and 30% SODIS-user, respectively ($p<.05$). In both areas, the promotion was carried out by an NGO (Lumanti and WEPCO, respectively) and during phases 1 and 2, respectively. Although both percentages are above average, low income people seem to be more receptive to the SODIS method. However, this trend cannot be confirmed

when looking at Codes 07 and 08. 33% SODIS-user for the low income area and 44% for the middle income area were found ($p=n.s.$). Here promotion took place in Phase 2 by KMC.

Finally, the district and rural/urban effect must not be overlooked.

7. **Comparison urban Thimi – urban Kathmandu:** When looking at exactly the same promoting NGO (Lumanti) in a comparison of Codes 01 and 02, the difference between Thimi and Kathmandu is huge. In Thimi, Lumanti achieved 10% SWC and in Kathmandu 50% ($p<.001$). So, there is evidence that SODIS is perceived better in Kathmandu urban areas than in Thimi urban areas.
8. **Comparison urban Thimi – urban Lalitpur:** First, a comparison between Thimi and Lalitpur can be made looking at Codes 02, 04 (both Thimi) and 05 (Lalitpur). Promotion had taken place in urban middle income areas during phases 1 (Thimi) and 2 (Lalitpur), promoting organizations were NGOs (Nawa Chatrodaya, Lumanti (both Thimi) and WEPCO (Lalitpur). There is a difference between Nawa Chatrodaya and Lumanti with regards to regular SODIS use (see comparison 1), but no further difference to Lalitpur can be found. SODIS-user percentages are 10%, 19% and 30% ($p=n.s.$ between Thimi (Nawa Chatrodaya) and Lalitpur, but $p<.05$ between Thimi (Lumanti) and Lalitpur). However, no differences are found when comparing Thimi with Lalitpur (Codes 12 and 13). Promotion in these urban middle income areas was during phases 4 (Thimi) and 5 (Lalitpur) by the municipalities. In Thimi, 20% are SODIS-user, in Lalitpur 24% ($p=n.s.$).
9. **Comparison urban Kathmandu – urban Lalitpur:** Also, Kathmandu and Lalitpur can be compared directly, looking at Codes 07 and 09. Promotion took place during phases 2 (Kathmandu) and 4 (Lalitpur) by the municipality in urban middle income areas. In Kathmandu, 44% SODIS-user and in Lalitpur 34% SODIS-user are found ($p=n.s.$). So, it seems that in Lalitpur SODIS got less accepted than in Kathmandu middle income areas. Into the same direction already have pointed the results of comparison 4, where tendentially a later promotion in Lalitpur achieved less SODIS-user than an earlier promotion in Kathmandu.
10. **Comparison rural Bhaktapur – rural Lalitpur:** Furthermore, rural areas in two different districts can be compared, looking at Codes 03 and 06. In Bhaktapur and Lalitpur, two NGOs promoted SODIS/HWTS in mixed income rural areas during phases 1 and 2, respectively. In Bhaktapur, 12% and in Lalitpur 9% SODIS-user are found ($p=n.s.$). So, Bhaktapur and Lalitpur rural areas seem to be very similar areas with regards to SODIS use.

Since the districts are closely connected to the characteristics rural or urban, one could also leave away the district effect and only look at urban vs. rural effects (under the assumption that income does not play a role).

11. **Comparison rural – urban areas:** Rural areas in Bhaktapur (Code 03) compared with urban areas in Kathmandu (Code 01) and Thimi (Codes 02 and 04), all NGO promotion during phase 1, reveal much lower SODIS-user percentages for the rural areas (12%) compared to the Kathmandu urban ones (50%; $p<.001$). However, comparing the rural area with the urban areas of Thimi (10% and 19% SODIS-user), no such differences can be found (both $p=n.s.$).
12. **Comparison rural – urban areas:** Another comparison of a rural area with an urban one in Lalitpur, in contrast, supports the difference hypothesis between rural and urban areas (Codes 06 and 05; NGO promotion, phase 2). The rural area has much lower SODIS-user percentages (9%) than the urban one (30%, $p<.01$). So, SODIS promotion in rural areas seems to be less effective than in urban areas of Lalitpur. However, again questioning the aforementioned assumption is a look at the one rural area in Bhaktapur which had DPHO promotion (Code 11; SODIS-user=48%). This area has one of the highest SODIS-user percentages of all areas. So maybe here the DPHO seems to have made the difference, as it was already pointed out in comparison 5, or rural areas aren't that difficult to convince of SODIS use.

As it was already found for safe water consumption, also with regards to higher percentages of the population using SODIS, municipalities and NGOs working in urban areas are equally effective. In rural areas, the DPHO proofed to achieve higher percentages of SODIS users than NGOs. However, also for SODIS use, the success can already vary considerably between different NGOs.

Also similar to SWC, the promotion phase does not seem to influence the amount of SODIS users. Neither does the income level.

Regarding the different investigated districts, in contrast to SWC for SODIS use Kathmandu and Lalitpur seem to be a little different with Kathmandu areas having 10-20% more SODIS-user. Rather, Lalitpur and Thimi urban areas can be regarded as being similar. The rural areas of Bhaktapur and Lalitpur are also very similar regarding SODIS-user percentages as it was already found for percentages of SWC. There are indicators that SODIS use is about three times higher in urban areas compared to rural areas. One explanation may be the often mentioned perception of the water quality as being good in the investigated rural areas as well as Thimi compared to a more critical perception of water quality in the investigated urban areas. Also, in some rural areas the accessibility of bottles may be a problem. However, DPHO promotion in rural areas proofed to be equally effective like any promotion in urban areas. So the relation of the degree of urbanization with SODIS use is not yet fully understood.

6 Promotion campaign influences

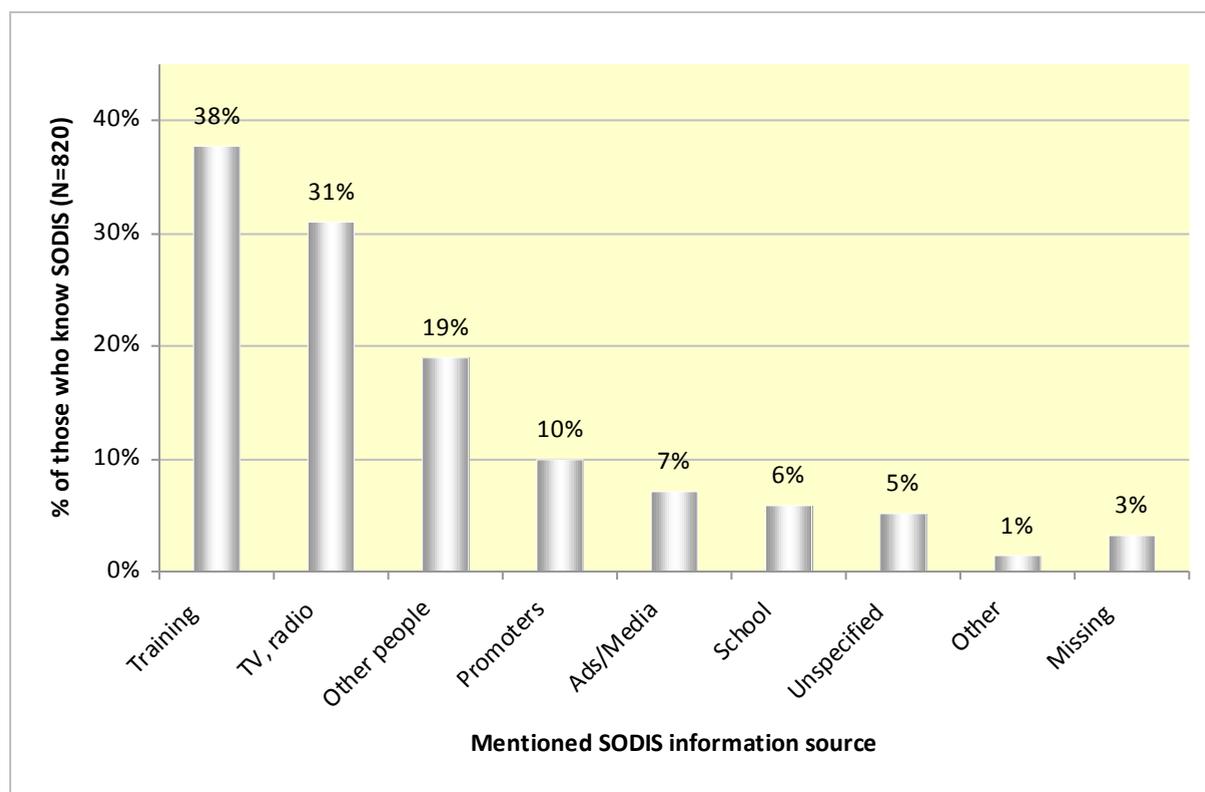
6.1 Different information sources

As described before (3.3), main promotion activities consisted of group trainings and follow-up household visits. However, it cannot be assumed that all households in an intervention community actually received the training and the follow-up. Therefore, an "intervention check" asked for where people had actually heard about SODIS.

38% of the interviewees stated they got information about SODIS during a group training, 31% heard of it from TV or radio, 19% got information from other people (family or friends), and 10% received household visits from promoters. Each less than 10% saw public or newspaper ads, heard something about SODIS in a school, or gave a non-specifiable information source. On average, 1.17 SODIS information sources were mentioned by one person. Figure 4 shows a summary.

Since the promotion campaigns did not only aim at increasing SODIS use but safe water consumption in general, influences on SODIS use and SWC are calculated.

Comparing overall current SODIS non-user and user regarding their information sources (while controlling for the total number of information sources), no positive influence of any of the information sources on current SODIS use could be found. Odds ratios for SODIS use were only increased by the sheer number of information source (OR=1.73 per information source, $p=.009$; Table 11).

Figure 4. Different SODIS information sources mentioned by those people knowing SODIS (N=820).**Table 11.** Odds ratios for SODIS-user (N=221) compared to SODIS non-user (N=599) regarding different SODIS information sources while controlling for total number of information sources.

Variable	SODIS non-user	SODIS user	OR	Lower C.I.	Upper C.I.	p
No. of information sources	1.14	1.26	1.73	1.15	2.62	0.009
Other people	17%	24%	1.44	0.89	2.33	0.143
Training	37%	38%	1.07	0.69	1.67	0.749
Promoter	10%	9%	0.87	0.47	1.61	0.655
TV/Radio	31%	32%	0.84	0.52	1.35	0.470

Note: OR = Odds ratio (significant OR at $p < 0.05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample knowing SODIS (N=820); a constant was included in the model. Explained variance of the dependent variable is 2.8% (Nagelkerke).

However, we could find a significant influence of some information sources on the fact if people initially *tried out* the SODIS method. In addition to the positive influence of the number of information sources (OR=2.09, $p=0.001$), training (OR=1.59, $p=0.047$) and promoters (OR=1.95, marginally significant $p=0.053$) also increased the chances that people started using SODIS, whereas TV or radio decreased the chances that people would at least try out the SODIS method (OR=0.44, $p=0.001$; Table 12).

Furthermore, increased odds ratios for being a regular compared to an irregular SODIS user were found for training (OR=2.55, $p=0.016$) and promoters (OR=3.62, $p=0.027$; Table 13).

Unexpectedly, overall safe water consumption was not significantly influenced by any of the SODIS/HWTS related information sources (Table 14).

Table 12. Odds ratios for those who those who tried out SODIS (includes relapser and current user; N=571) compared to those who never tried out SODIS (N=249) regarding different SODIS information sources while controlling for total number of information sources.

Variable	Never tried SODIS	Tried out SODIS	OR	Lower C.I.	Upper C.I.	p
No. of information sources	1.12	1.20	2.09	1.34	3.27	0.001
Other people	22%	17%	0.70	0.43	1.14	0.149
Training	25%	42%	1.59	1.01	2.50	0.047
Promoter	6%	12%	1.95	0.99	3.85	0.053
TV/Radio	41%	27%	0.44	0.28	0.71	0.001

Note: OR = Odds ratio (significant OR at $p < .05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample knowing SODIS (N=820); a constant was included in the model. Explained variance of the dependent variable is 8.8% (Nagelkerke).

Table 13. Odds ratios for regular SODIS-user (N=113) compared to irregular SODIS-user (N=108) regarding different SODIS information sources while controlling for total number of information sources.

Variable	Irregular SODIS user	Regular SODIS user	OR	Lower C.I.	Upper C.I.	p
No. of information sources	1.32	1.20	0.51	0.25	1.02	0.056
Other people	32%	17%	0.87	0.38	1.99	0.746
Training	31%	45%	2.55	1.19	5.45	0.016
Promoter	6%	12%	3.62	1.16	11.27	0.027
TV/Radio	33%	30%	1.78	0.78	4.07	0.171

Note: OR = Odds ratio (significant OR at $p < .05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample using SODIS (N=221); a constant was included in the model. Explained variance of the dependent variable is 9.6% (Nagelkerke).

Table 14. Odds ratios for SWC (N=442) compared to UWC (N=376) regarding different SODIS information sources while controlling for total number of information sources.

Variable	UWC	SWC	OR	Lower C.I.	Upper C.I.	p
No. of information sources	1.14	1.20	1.27	0.87	1.87	0.218
Other people	20%	18%	0.77	0.49	1.21	0.255
Training	38%	37%	0.89	0.60	1.33	0.576
Promoter	11%	9%	0.69	0.40	1.18	0.173
TV/Radio	26%	34%	1.22	0.79	1.87	0.369

Note: OR = Odds ratio (significant OR at $p < .05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample knowing SODIS (N=820); a constant was included in the model. Explained variance of the dependent variable is 1.5% (Nagelkerke).

Summarizing, the more different information sources a person had heard from about SODIS the higher is the chance of being a current user. In addition, promoters and trainings contributed to a) that people at least tried out the SODIS method, and b) in case they continued SODIS use that they became regular users. Interestingly, if people heard of SODIS via radio and TV, chances that they tried out the method were lowered. It seems that radio and TV as information sources are not enough to initiate a new behavior compared to the more interpersonal information sources training

and promoters. Unexpectedly, perception of any of the information sources did not explain why some people consume only safe water whereas others don't.

6.2 Distributed materials

During the promotion period (mainly during the group trainings), sometimes promotion materials were distributed to participating households. However, only 26% of the households reported to have received such material. 15% received a poster, 5% a flyer or pamphlet, 4% a PET-bottle, and 3% a calendar. Due to the low frequency of distributed promotion materials, no effects on SODIS use or untreated water consumption could be found.

6.3 Reasons for SODIS use and experienced problems

People were asked openly why they started using SODIS and which kind of problems they experienced that made them stop using SODIS.

6.3.1 Reasons to start SODIS use

The main reasons why people started using SODIS (N=571) was the promotion activities (60%). Only few mentioned other reasons such as health concerns (11%), because the method featured certain advantages (6%), because of other people (5%), or the media (4%). 13% did not mention any reason at all. Interestingly, the reason why people started to use SODIS makes a difference when comparing relapsers (those who stopped) with continued users (Table 15).

Table 15. Odds ratios for SODIS users (N=221) compared to SODIS relapsers (N=350) regarding different reasons for initially starting SODIS use.

Variable	Relapsers	Continued users	OR	Lower C.I.	Upper C.I.	p
Promotion	60%	58%	1.41	0.86	2.29	0.170
Health concerns	10%	14%	2.02	1.06	3.87	0.033
Method	4%	10%	3.34	1.50	7.42	0.003
Other people	5%	4%	0.96	0.38	2.43	0.930
Media	3%	4%	1.51	0.56	4.06	0.411

Note: OR = Odds ratio (significant OR at $p < .05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample that has at some point started using SODIS (N=571); a constant was included in the model. Explained variance of the dependent variable is 2.9% (Nagelkerke).

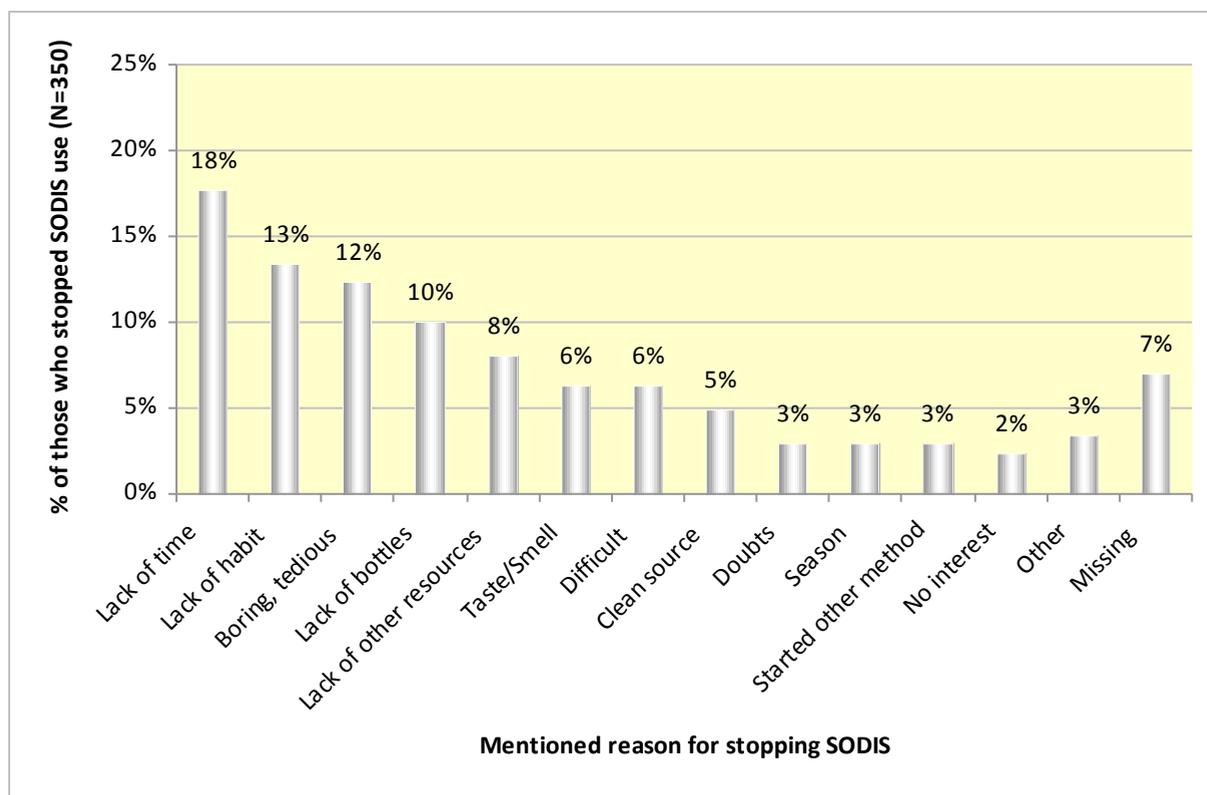
Those who started using SODIS for health concerns or the method itself showed a higher probability to still be a SODIS user at the time of investigation, even if controlled for the time of promotion activities (promotion phase). Health concern as a reason to start SODIS use increased chances for continued SODIS use by 2.02 and method as a start reason even by 3.34.

Health concern or the method itself as reasons to start SODIS are two reasons reflecting a conscious decision. It seems that if people start a behavior based on their decision rather than external influences like promotion activities, other people or the media, they are eventually more likely to stay with the behavior.

6.3.2 Main problems experienced with SODIS use

Main problems why people stopped using SODIS (N=350) were rather behavior related than due to missing resources. 18% mentioned a lack of time (which mostly reflects an unsuccessful reorganization of daily routines after starting SODIS use), 13% mentioned habit related problems such as forgetting and not having a habit, 12% found it boring or tedious to prepare the bottles (often, shaking the bottles was still part of the instruction which makes the SODIS preparation indeed a bit lengthy), 6% found it too difficult (which may have been the result of an insufficient explanation of the method), 6% did not like the taste (note that the taste is not altered by the SODIS method, mostly the bottles are responsible for the (bad) taste or smell), and 3% doubted the effectiveness of the method. Resource related problems were missing bottles (10%), missing space, sun or water (8%), a clean source (which may not be clean though; 5%), an unfavorable season (3%) or another method was started instead (3%). 7% did not give a reason why they stopped using SODIS. Figure 5 shows a summary.

Figure 5. Reasons why people stopped using SODIS mentioned by the relapsers (N=350).



In total, behavior related reasons for stopped SODIS use accounted for 59% of all mentioned reasons, whereas resource related problems were only mentioned by 29% of all those who stopped using

SODIS. This can be interpreted positively, because the behavior related reasons can more directly be influenced by behavior change interventions.

7 The behavior change process to using different water treatment options

Models explaining human behavior stress several motivations or groups of factors influencing the performance of a behavior. Main motivational factors commonly proposed are related to risk awareness and already existing health related behaviors, attitude, social influences, resource availability, intention and habits. First, these factors are illustrated more in detail, followed by an analysis of which factors are more or less influential for the consumption of a certain water type.

7.1 Introduction to behavior change models

Risk awareness and hygiene habits describe the awareness and understanding of a problematic situation (i.e. that untreated water may cause diarrhea), and a certain need for a new behavior must be developed (Rogers, 1995, p. 164). Then, at some point, the individual has to realize that there exists a solution to the problem (i.e. the SODIS method or any other HWTS). One indicator of how much awareness towards hygiene and health already exists is existing hygiene habits.

An *attitude* is the result of a general internal evaluation of pros and cons of the new behavior (i.e. using SODIS). These pros and cons cannot only be "rational" facts, but also the "emotional" evaluation plays an important role (Heri & Mosler, 2008; Tamas, 2009, p. 75). For example, rational facts can be arguments like: SODIS is easy; SODIS does not cost a lot of money etc. The emotional side of attitude is more linked to feelings like: I like the idea of using SODIS, or SODIS water tastes good.

Social influence always takes place – humans rarely decide solely on their own. We all have ideas about which behaviors are approved or disapproved by our social environment and which behaviors are performed by a majority of the people. Usually, we are more likely to perform a behavior that is approved and performed by many others (i.e. SODIS is an accepted method by my friends and neighbors, and at least some are also using it).

Risk awareness, attitude and social factors together form the *intention* to perform a certain behavior. The intention is a kind of decision to at least try out the behavior in the near future. After an intention is formed, usually the necessary preparatory steps are undertaken, i.e. where can I obtain SODIS bottles, when is a good time to prepare them etc. Intention, in turn, is one strong predictor of *behavior*.

Of course, not only awareness, attitudes and social influences are influencing our intentions and driving our behaviors. We also need to have a confidence that we are able to perform the behavior, which includes the necessary *knowledge* (i.e. the steps how to use SODIS are known) as well as the necessary *resources* must be available (i.e. bottles and sunny spaces for SODIS). These factors are said to influence both, intention and behavior.

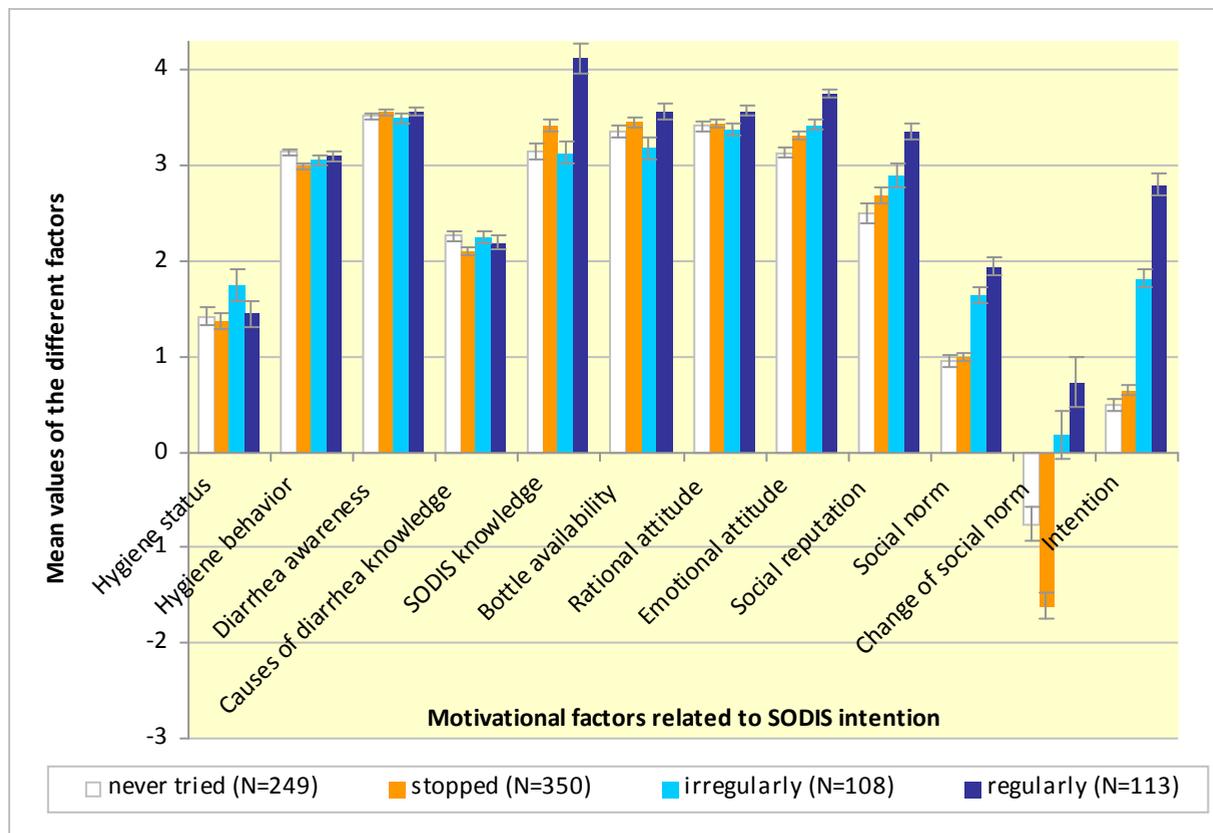
After the behavior has been started (i.e. the person started using SODIS), it is important to maintain behavior performance and not to stop again. Moreover, it is important to regularly use SODIS or any kind of water treatment to benefit from positive health impacts. Here *habit* related factors are playing an important role, such as regularity of behavior performance, automaticity, not forgetting the behavior, and duration of behavior performance.

7.2 Motivations related to SODIS intention and use

7.2.1 Explaining the intention to use SODIS

First, the following Figure 6 shows the motivations related to the intention to use SODIS. We compare people who never tried SODIS, relapsers (those who stopped), irregular and regular users. In addition to presenting the mean values, with a linear regression it was aimed to explain the intention to use SODIS (Table 16).

Figure 6. Mean values of motivational factors related to SODIS intention by different groups of SODIS non-users and users.



Note: For details on factor endpoints, see Table 16.

Table 16. Standardized betas of a linear regression of various factors on the intention to use SODIS (N=676), their means, standard deviations and scale coding.

Variable	Regression on intention		Mean	SD	Range	Scale end point coding	
	stand. β	p				Low end	High end
Intention	-	-	1.09	1.26	0 to 4	no water is intended to be treated with SODIS	100% of water is intended to be treated with SODIS
Hygiene status scale	-0.05	0.153	1.51	1.53	-4 to 4	a lot dirtier than average	a lot cleaner than average
Hygiene behavior scale	-0.04	0.235	3.07	0.56	0 to 4	no hygiene behavior	very strong hygiene behavior
Diarrhea awareness scale	-0.06	0.095	3.53	0.55	0 to 4	no diarrhea awareness	very high diarrhea awareness
Knowledge of causes diarrhea	-0.04	0.293	2.21	0.72	0 to 4	0 points	4 points
Knowledge of SODIS	0.12	0.001	3.50	1.35	0 to 9	0 points	9 points
Bottle availability	-0.03	0.348	3.41	0.99	0 to 4	bottles are never available	bottles are always available
Rational attitude scale	-0.04	0.313	3.45	0.68	0 to 4	very low rational benefit	very high rational benefit
Emotional attitude scale	0.21	0.000	3.36	0.68	0 to 4	very low emotional liking	very high emotional liking
Social reputation	0.00	0.942	2.77	1.49	-4 to 4	very negative social reputation	very positive social reputation
Social norm	0.26	0.000	1.21	0.94	0 to 4	nobody uses SODIS	everyone uses SODIS
Change of social norm	0.24	0.000	-0.83	2.64	-4 to 4	a lot less people use SODIS since its introduction	a lot more people use SODIS since its introduction

Note: Stand. β = standardized beta weight of the linear regression (minimum -1, maximum +1; significant β at $p < .05$ level are marked bold), p = significance level, SD = standard deviation. All stand. β were calculated with one linear multivariate regression using the entire sample knowing SODIS; a constant was included in the model; explained variance of intention was 28%. N was reduced due to listwise deletion of missing values.

The risk awareness and hygiene habit indicators – hygiene status, hygiene behavior, awareness, and knowledge related to diarrhea – do not show differences between the different SODIS non-user and user groups. There is also no relation to the strength of intention to use SODIS.

The knowledge level of how to use SODIS and why it works is clearly highest for regular users and shows a weak relation to intention ($\beta = .12$, $p = .001$). Bottles are rated to be easily available by all groups; no relation to intention was found.

Rational as well as emotional attitude are both very positive, but for the emotional attitude small but clear differences were found between the different groups of SODIS non-user and user: never tried < stopped < irregularly < regularly. Also, the emotional attitude scale, consisting of the belief about the taste, the effect on health, and the liking of SODIS water, shows a medium sized influence on intention ($\beta = .21$, $p < .001$).

The social reputation of SODIS within the community also showed the same clear differences between the different groups of SODIS non-user and user as the emotional attitude; however, social reputation does not significantly influence SODIS intention in the regression analysis. Very much in contrast to the formerly presented indicators, social norm and the perceived change of the social

norm since the end of the promotion phase are rated rather low. Clear differences exist between SODIS non-user (never tried + stopped) and user (irregular + regular) – non-user rate the social norm a lot lower and perceived a negative change (less people using SODIS) whereas SODIS user rate the social norm to be on a medium level and the change to be positive (more people using SODIS). Both indicators show the strongest influence on intention among all factors (social norm: $\beta=.26$, $p<.001$; change of social norm: $\beta=.24$, $p<.001$).

All regression weights, correlations of the motivational factors with intention, overall means, standard deviations and coding of the variables can be found in Table 16.

7.2.2 Explaining the use of SODIS

With a more positive intention, in turn, SODIS use becomes more likely ($OR=3.44$, $p<.001$). Higher knowledge and bottle availability do not increase the probability of someone using SODIS. In addition to intention, we found communication about SODIS to be important ($OR=1.38$, $p=.002$; Table 17).

Table 17. Odds ratios for SODIS non-user (N=500) and user (N=212) regarding different motivations for starting SODIS use.

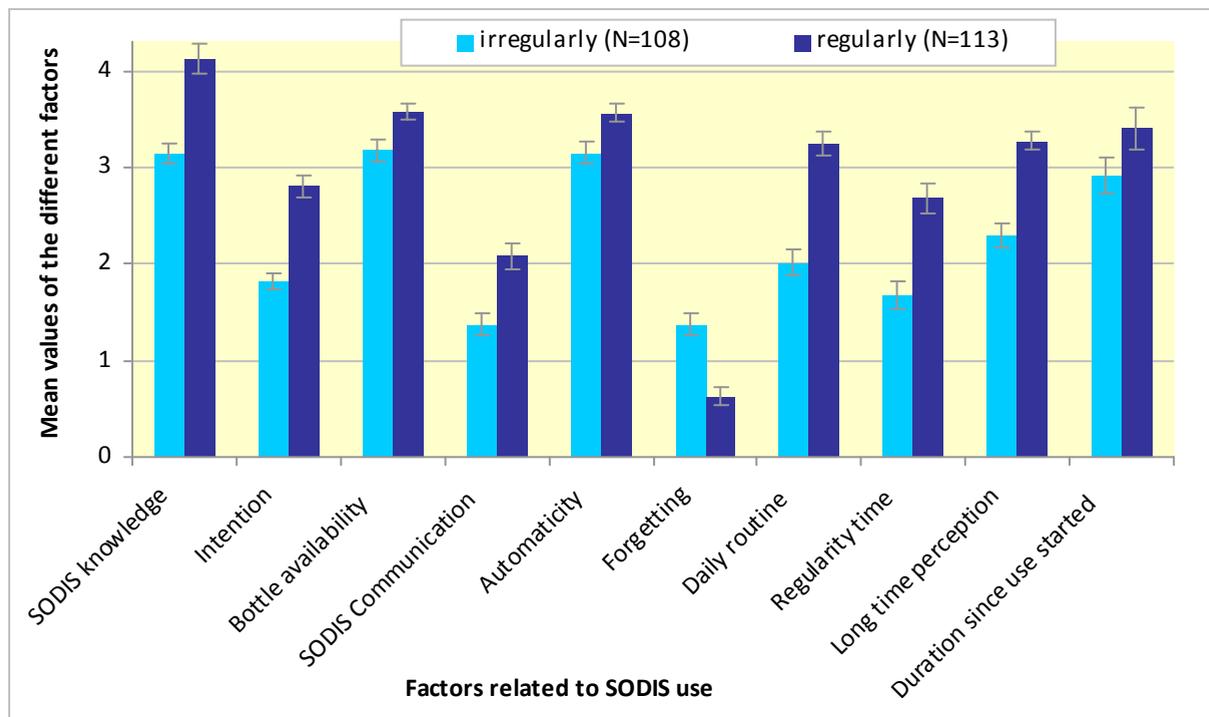
Variable	SODIS non-user	SODIS user	OR	Lower C.I.	Upper C.I.	p
Knowledge SODIS	3.37	3.67	0.86	0.73	1.03	0.103
Bottle availability	3.41	3.41	0.98	0.80	1.20	0.809
Intention SODIS	0.57	2.33	3.44	2.79	4.25	0.000
Communication SODIS	0.65	1.74	1.38	1.12	1.69	0.002

Note: OR = Odds ratio (significant OR at $p<.05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample knowing SODIS (N=712); a constant was included in the model; explained variance was 50% (Nagelkerke). N was reduced due to listwise deletion of missing values. For details on factor endpoints, see above Table 16 and below Table 18.

Once people started using SODIS, we find irregular and regular current SODIS user. Since irregular SODIS users more often consume untreated water (see above, Table 9), it is the aim to have a sustainable, regular SODIS use. Means of factors possibly influencing regular SODIS use are presented in Figure 7.

For all factors, regular SODIS user have the more positive values regarding SODIS behavior. They know more about SODIS, have a more positive intention, think that bottles are easier available, communicate more about SODIS, perceive SODIS more as being an automatic behavior, forget less to prepare SODIS, have SODIS integrated into their daily routine, more often prepare SODIS at the same time of the day, perceive as having used SODIS since a longer time, and also do have used SODIS longer than irregular users. In a multiple logistic regression, regular SODIS use is supported by higher SODIS knowledge ($OR=1.46$, $p=.029$), a higher intention ($OR=1.46$, $p=.05$) automaticity of behavior performance ($OR=1.57$, $p=.036$), that SODIS belongs to people's daily routine ($OR=1.52$, $p=.007$), and that it is always prepared at the same time ($OR=1.32$, $p=.035$). Interestingly, the real time duration of SODIS use does not have a significant impact on regular usage, only the *perception* that SODIS has been used since a long time already ($OR=1.87$, $p=.001$; all numbers Table 18).

Figure 7. Mean values of factors related to SODIS use by different groups of SODIS users (irregular + regular SODIS user).



Note: For details on factor endpoints, see Table 18.

Summarizing, social influence and people's emotional attitude are very important for developing an intention. People have to know they are not the only ones in their community using SODIS, they have to like SODIS and they have to be convinced that it is something good. The taste of the water must be perceived as good and a positive health impact must be anticipated. Additionally, sufficient knowledge about SODIS is necessary to develop a positive intention.

Intention, in turn, is a powerful influential factor for behavior – the more positive the intention, the more likely a person is to use SODIS. Additionally, the more people communicate about SODIS, the more likely they are to also use it. Once people started using SODIS, it is important that the behavior becomes an automatic daily routine. Ideally, the bottles are prepared every day at the same time, so people quickly perceive SODIS as a long-term established automatic behavior.

So, basically social influence and social exchange have to be increased, for example, make people aware of how many other people are already using SODIS in their community, and stimulate communication among them. Secondly, initiate activities that create positive emotions (i.e. group games, some fun), give people the chance of tasting SODIS water, convince them of the water's positive health impact and give them enough knowledge of how and why SODIS works. This will support them in their decision to use SODIS and that they actually start trying it out. Once they started, they actively have to be supported in establishing a regular daily routine to prepare the bottles. People should be requested to fix a certain time when they prepare the bottles each day. Habit development could involve regular household visits as well as discussion rounds about experiences and difficulties during the daily application.

Table 18. Odds ratios for irregular SODIS user (N=87) and regular SODIS user (N=100) regarding motivations and habit factors for using SODIS regularly.

Variable	Regression on behavior				Mean		Range	Scale end point coding	
	OR	Lower C.I.	Upper C.I.	p	Irreg. user	Reg. user		Low end	High end
Knowledge SODIS	1.46	1.04	2.06	0.029	3.22	4.16	0 to 9	0 points	9 points
Bottle availability	1.26	0.82	1.92	0.295	1.83	2.84	0 to 4	bottles are never available	bottles are always available
Intention SODIS	1.46	1.00	2.13	0.050	3.18	3.59	0 to 4	no water is intended to be treated with SODIS	100% of water is intended to be treated with SODIS
Communication SODIS	1.31	0.93	1.84	0.117	1.33	2.02	0 to 4	never talk about SODIS	talk about SODIS very often
Automaticity	1.57	1.03	2.40	0.036	3.18	3.54	0 to 4	not at all automatic	very automatic
Forgetting	0.70	0.45	1.07	0.096	1.39	0.63	0 to 4	never forget	forget very often
Daily routine	1.52	1.12	2.05	0.007	1.97	3.24	0 to 4	not a daily routine	very much a daily routine
Regularity time	1.32	1.02	1.71	0.035	1.54	2.65	0 to 4	always a different time	always the same time
Long time perception	1.87	1.27	2.76	0.001	2.22	3.34	0 to 4	not at all	for a very long time
Duration since use started (yrs.)	0.88	0.72	1.08	0.217	2.94	3.47	0 to 16	since 0.08 years	since 16 years

Note: OR = Odds ratio (significant OR at $p < .05$ level are marked bold), C.I. = Confidence interval of OR, p = Significance level. All OR were calculated with one multivariate logistic regression using the entire sample using SODIS (N=187); a constant was included in the model; explained variance was 56% (Nagelkerke). N was reduced due to listwise deletion of missing values.

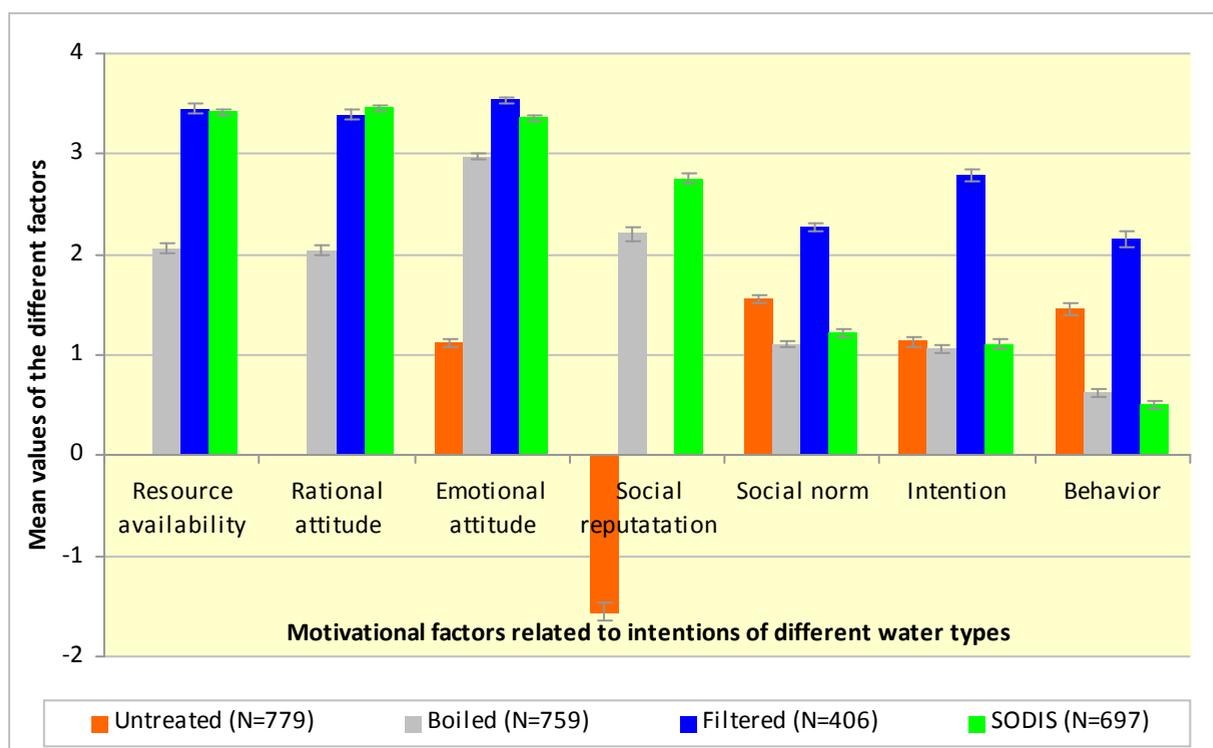
7.3 Comparing predictors of SODIS, boiling, filtered and untreated water intention and use

Analog to SODIS intention and use, influencing factors for boiling, filtering and untreated water intention and use were investigated. For chlorination and bought water, the number of cases is too low for further statistical analyses. SODIS related factors are once again included into the following tables to facilitate a direct comparison.

7.3.1 Explaining the intentions to do SODIS, boil, filter and consume untreated water

First, we show the mean levels of all the factors related to boiling, filtered and untreated water intention and consumption (Figure 8). In a second step, these factors are related to boiling, filtering and untreated water intentions (Tables 19, 20, and 21).

Figure 8. Mean values of factors related to intentions of different water types (untreated, boiled, filtered and SODIS water).



Note: For untreated, boiled and SODIS water, data of the entire sample were available (N was only lowered due to listwise deletion of missing values when calculating the regressions). However, for the factors related to filtered water, mostly filter users were asked, resulting in a general lower N for factors related to filtered water consumption. For details on factor endpoints, see Table 16, Table 19, Table 20, and Table 21. For *behavior* the endpoints are: 0 = no untreated, boiled, filtered or SODIS water is consumed; 4 = 100% of untreated, boiled, filtered or SODIS water is consumed. For untreated water, *resource availability* and *rational attitude* (time and money costs) were not possible to be assessed; for filtered water consumption the *social reputation* is missing.

The risk awareness factors – already presented in the above Figure 6 – contribute a little in explaining boiling, filtering and untreated water intentions in contrast to SODIS water intention, where no relation at all was found. The intention to boil water is actually negatively influenced by diarrhea awareness, meaning that the lower the diarrhea awareness the higher the intention to boil ($\beta=-0.10$, $p=.003$). However, this relationship is very weak. On the intention to filter water, hygiene behavior shows a weak positive relationship, meaning that the more hygiene behavior was shown the higher the intention to filter water ($\beta=0.13$, $p=.004$). The same scale shows a negative relation to the intention to consume untreated water ($\beta=-0.07$, $p=.002$), meaning that the more hygiene behavior was shown the lower the intention to consume untreated water. However, also these two relations are very weak.

Availability of SODIS bottles and filters is judged equally positive; availability of firewood or gas for boiling is somewhat lower. However, influence on intention does never reach significance.

Rational attitude, reflecting time and money costs of the water treatment option, is very positive for SODIS and filtering water (low time and money costs) and somewhat lower for boiled water (higher time and money costs). However, like resource availability, rational attitude is never significantly impacting the intention to consume the respective water type.

More important for intention development is the emotional aspect of attitude. Rated positively for all three water treatment options and even slightly positive for untreated water, each emotional attitude influences the corresponding intention. Interestingly, this influence is strongest for untreated water intention ($\beta=.43$, $p<.001$) compared to the intentions to consume filtered ($\beta=0.30$, $p<.001$), boiled ($\beta=0.31$, $p<.001$), and SODIS water ($\beta=0.21$, $p<.001$).

Social reputation, being moderately positive for boiling as well as SODIS water (not assessed for filtering water) and moderately negative for untreated water consumption, never influences the intention. In contrast, it is quite important for a positive intention to perceive many other people also consuming a certain water type (social norm). Social norm shows a similar influence on all intentions like the emotional attitude. The influence is strongest on untreated water intention ($\beta=.44$, $p<.001$); for the treated water intentions the influence is more moderate ranging from .26 to .33 (all $p<.001$). The level of social norm reflects real user percentages quite well.

Comparing the mean levels of intention, the intention to filter water clearly peaks out. The mean value of around 3 indicates that these people intend to filter about 75% of all the water they consume. The other intentions range around 1, which equals to the intention to consume 25% of all water consumed of the respective water type. Comparing the level of intention to the level of real consumption, it shows that all intentions related to treated water are slightly above the real consumption, indicating that people intend to filter, boil, and treat with SODIS more water than they do at the moment. On the other hand, the untreated water intention is slightly below the current consumption level, so people intend to decrease the proportion of consumed untreated water. The level for filtered water intention and also behavior is higher, because here the basis was not the entire sample, but only a subsample who answered the filter related questions, which were mainly filter users.

All details on the regressions on the intentions to boil, filter, or consume untreated water can be found in Tables 19, 20, and 21; the details related to SODIS water intention were already presented more above in Table 16.

Summarizing, for all intentions the emotional attitude is important as well as the social norm. Both influences are stronger for untreated water intention compared to the intentions related to treated water consumption. This results in a better explained variance of untreated water intention. For the treated water intentions, it seems additional factors not assessed with the presented data have to be considered to achieve a better understanding of driving factors of these intentions.

Table 19. Standardized betas of a linear regression of various factors on the intention to boil water (N=759), their means, standard deviations and scale coding.

Variable	Regression on intention		Mean	SD	Range	Scale end point coding	
	stand. β	p				Low end	High end
Intention	-	-	1.06	1.19	0 to 4	no water is intended to be boiled	100% of water is intended to be boiled
Hygiene status scale	0.02	0.608	1.46	1.53	-4 to 4	a lot dirtier than average	a lot cleaner than average

Table 19. continued.

Variable	Regression on intention		Mean	SD	Range	Scale end point coding	
	stand. β	p				Low end	High end
Hygiene behavior scale	-0.06	0.082	3.08	0.56	0 to 4	no hygiene behavior	very strong hygiene behavior
Diarrhea awareness scale	-0.10	0.003	3.56	0.55	0 to 4	no diarrhea awareness	very high diarrhea awareness
Knowledge of causes diarrhea	0.02	0.512	2.19	0.73	0 to 4	0 points	4 points
Firewood and gas availability	0.07	0.103	2.06	1.30	0 to 4	firewood or gas are never available	firewood or gas are always available
Rational attitude scale	-0.03	0.381	2.04	1.23	0 to 4	very low rational benefit	very high rational benefit
Emotional attitude scale	0.31	0.000	2.97	0.79	0 to 4	very low emotional liking	very high emotional liking
Social reputation	0.04	0.226	2.20	1.75	-4 to 4	very negative social reputation	very positive social reputation
Social norm	0.30	0.000	1.11	0.81	0 to 4	nobody boils water	everyone boils water

Note: Stand. β = standardized beta weight of the linear regression (minimum -1, maximum +1; significant β at $p < .05$ level are marked bold), p = significance level, r = Pearson correlation coefficient (significant r at $p < .05$ level are marked bold), SD = standard deviation. All stand. β were calculated with one linear multivariate regression using the entire sample knowing SODIS; a constant was included in the model; explained variance of intention was 24%. N was reduced due to listwise deletion of missing values.

Table 20. Standardized betas of a linear regression of various factors on the intention to filter water (N=406), their means, standard deviations and scale coding.

Variable	Regression on intention		Mean	SD	Range	Scale end point coding	
	stand. β	p				Low end	High end
Intention	-	-	2.78	1.27	0 to 4	no water is intended to be filtered	100% of water is intended to be filtered
Hygiene status scale	0.08	0.054	1.57	1.55	-4 to 4	a lot dirtier than average	a lot cleaner than average
Hygiene behavior scale	0.13	0.004	3.11	0.57	0 to 4	no hygiene behavior	very strong hygiene behavior
Diarrhea Awareness Scale	0.00	0.971	3.50	0.58	0 to 4	no diarrhea awareness	very high diarrhea awareness
Knowledge Causes Diarrhea	-0.01	0.783	2.20	0.74	0 to 4	0 points	4 points
Filter availability	0.08	0.072	3.46	0.96	0 to 4	filter are never available	filter are always available
Rational attitude scale	0.05	0.268	3.39	0.92	0 to 4	very low rational benefit	very high rational benefit
Emotional attitude scale	0.30	0.000	3.54	0.57	0 to 4	very low emotional liking	very high emotional liking
Social norm	0.34	0.000	2.28	0.97	0 to 4	nobody filters water	everyone filters water

Note: Stand. β = standardized beta weight of the linear regression (minimum -1, maximum +1; significant β at $p < .05$ level are marked bold), p = significance level, r = Pearson correlation coefficient (significant r at $p < .05$ level are marked bold), SD = standard deviation. All stand. β were calculated with one linear multivariate regression using the subsample which had answered the filter-questions – these were mainly people who used a filter at the time of interview; a constant was included in the model; explained variance of intention was 37%.

N was reduced due to listwise deletion of missing values and because mainly filter users were asked for their motivations on filter use.

Table 21. Standardized betas of a linear regression of various factors on the intention to consume untreated water (N=779), their means, standard deviations and scale coding.

Variable	Regression on intention		Mean	SD	Range	Scale end point coding	
	stand. β	p				Low end	High end
Intention	-	-	1.14	1.43	0 to 4	no water is intended to be consumed untreated	100% of water is intended to be consumed untreated
Hygiene status scale	-0.03	0.225	1.45	1.53	-4 to 4	a lot dirtier than average	a lot cleaner than average
Hygiene behavior scale	-0.07	0.002	3.08	0.56	0 to 4	no hygiene behavior	very strong hygiene behavior
Diarrhea Awareness Scale	-0.02	0.346	3.55	0.55	0 to 4	no diarrhea awareness	very high diarrhea awareness
Knowledge Causes Diarrhea	0.01	0.718	2.20	0.73	0 to 4	0 points	4 points
Emotional attitude scale	0.43	0.000	1.11	1.26	0 to 4	very low emotional liking	very high emotional liking
Social reputation	0.01	0.805	-1.56	2.30	-4 to 4	very negative social reputation	very positive social reputation
Social norm	0.44	0.000	1.55	1.30	0 to 4	nobody drinks untreated water	everyone drinks untreated water

Note: Stand. β = standardized beta weight of the linear regression (minimum -1, maximum +1; significant β at $p < .05$ level are marked bold), p = significance level, r = Pearson correlation coefficient (significant r at $p < .05$ level are marked bold), SD = standard deviation. All stand. β were calculated with one linear multivariate regression using entire sample knowing SODIS; a constant was included in the model; explained variance of intention was 65%. N was reduced due to listwise deletion of missing values.

7.3.2 Explaining the use of SODIS, boiling, filters, and the consumption of untreated water

Looking at water consumption behaviors, the behavior boiling water for water treatment is influenced by the respective intention (OR=2.06, $p < .001$) and the perceived habit to do so (OR=1.67, $p < .001$). Habit was not assessed as detailed as for the SODIS behavior, however, the perception of how habitual a behavior is performed is known to be a good estimate of all the more detailed aspects of habit. In addition, the availability of firewood or gas to use for boiling has a slight *negative* influence on boiling (OR=0.8, $p = .031$), which cannot be explained.

Consuming filtered water is – as expected – also positively influenced by the intention to filter water (OR=1.72, $p < .001$) as well as the perceived habit (OR=1.51, $p = .002$), and also for consuming untreated water or not we find the same pattern (intention: OR=1.70, $p < .001$; perceived habit: OR=1.41, $p < .001$). All values are summarized in Table 22.

Summarizing, we can see a very consistent pattern across all water types, no matter if the water is treated or not. Social influence, communication (only SODIS), the emotional attitude (liking, taste

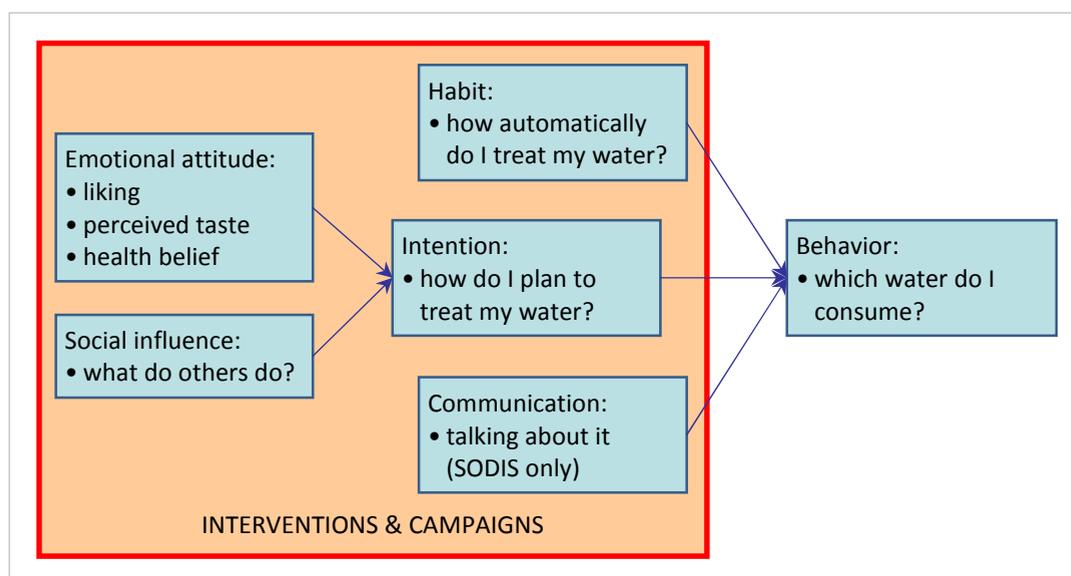
and health beliefs), intention, and habit are important driving factors of behavior and therefore have to be targeted by specifically designed interventions and promotion campaigns (see Figure 9).

Table 22. Odds ratios for comparing people who do not boil water for water treatment (N=680) with those who do (N=93), for comparing people who do not use filter (subsample; N=103) with those who do (N=322), and for comparing people who do not consume untreated water (N=434) with those who do (N=371) regarding resource availability, intention and perceived habit.

Variable	Boiled water (N=773) OR (C.I.)	Filtered water (N=425) OR (C.I.)	Untreated water (N=805) OR (C.I.)
Resource availability	0.80* (0.65, 0.98)	0.97 (0.74, 1.27)	-
Intention	2.06*** (1.61, 2.64)	1.72*** (1.28, 2.33)	1.70*** (1.41, 2.05)
Perceived habit	1.67*** (1.36, 2.05)	1.51*** (1.17, 1.95)	1.41*** (1.21, 1.64)

Note: p = Significance level, OR = Odds ratio (significant OR at $p < .05$ level are marked with *, at $p < .001$ level with ***), C.I. = Confidence interval of OR, N = number of cases which entered the calculation. All OR of one water type were calculated with one multivariate logistic regression using the entire sample knowing SODIS or a subsample in case of filtered water; a constant was included in each model; explained variance was 41% for boiled water, 34% for filtered water and 33% for untreated water. N was reduced due to listwise deletion of missing values. Endpoints for resource availability and intention see Table 16, Table 19, Table 20, and Table 21; for perceived habit: 0 = consuming boiled, filtered or untreated water is not perceived as habitual, 4 = consuming boiled, filtered or untreated water is perceived as very habitual.

Figure 9. Overall model of influences on water consumption behavior.



8 The status of institutionalization of HWTS in Nepal

The following institutions which had been formerly involved into the implementation of the SODIS/HWTS promotion activities were interviewed:

local NGOs

- Lumanti (local)
- ECCA (local)
- WEPCO (local)

Jana Kalyan Sangh (local)

Municipalities

- Kathmandu Municipality (KMC), Community Mobilization Unit (CMU)
- Thimi Municipality (LMC), Community Development Section (CDS)
- Kirtipur Municipality
- Lalitpur Municipality (LSMC), Community Development Section (CDS)

Lalitpur Municipality (LSMC), Public Health Section (PHS)

Sub-Units of Ministry of Health

- District Public Health Organization (DPHO) Kathmandu
- District Public Health Organization (DPHO) Bhaktapur

District Public Health Organization (DPHO) Lalitpur

In addition, the following institutions also being involved in HWTS promotion were interviewed:

Department of Water Supply and Sewerage (DWSS)

Sub-units of Ministry of Education

- Curriculum Development Center

National Center for Educational Development

national and international agencies

- UN Habitat (international)
- UNICEF (international)

ENPHO (national)

The following Table 23 gives an overview of all institutions – most of which had been interviewed directly – that were or are involved in the promotion of HWTS. It was tried not only to capture those institutions being directly in contact with ENPHO, but also others. In the table, different coding is used to indicate engagement in Eawag/Sandec supported projects (all were implemented with the help of ENPHO), engagement in collaboration with ENPHO but a different funding, and self-driven engagement.

Table 23. All institutions involved in SODIS/HWTS promotion during the last 5 years, currently and prospectively.

Institution	Time						Comments
	2004/ 05	2005 /06	2006/ 07	2007/ 08	current 2009	future 2010	
Local NGOs							
Lumanti	X	X	x	x	x	x	
Nawa Chatrodaya	X						
Ecca	X						chlorinator since some months
Swarnim; Indreni	X						no interview possible, probably not existent anymore
Wepco		X	x	x	x	x	
Prayatna Nepal		X					no interview possible, probably not existent anymore
Jana Kalya Sangh		X					at the moment not active at all
Governmental institutions							
Municipality Kathmandu	x	X	x	x	x	x	pamphlets during other programs, giving some information; chlorination program
Municipality Lalitpur			X		XX	XX	
Municipality Kirtipur				X		x	interest in more contact
Municipality Thimi				X		x	maybe SODIS within a solid waste management program
Municipalities Hetauda, Bhutwal, Nepalgunj					XX	XX	
District Public Health Office Kathmandu			X			x	
District Public Health Office Lalitpur				X		x	
District Public Health Office Bhaktapur				X		XX	Childhood Illness Program
Education Training Center Dhulikel			X				no interview, because responsible persons had moved NCED and CDC
National Center f. Educational Development (NCED)					x	x	SODIS added to trainer's training
Curriculum Development Center (CDC)					x	x	revision of curriculum lower secondary level -> SODIS included
Water Supply & Sanitation Division Office (WSSDO)					XX	XX	
Dept. of Water Supply & Sewerage (DWSS)					XX	x	integrated in the awareness program to Village Development Committee (VDC)
National Water Steering Committee	?	?	?	XX	XX	XX	many actors involved, discussion of national strategy
International agencies							
UNICEF	x	x	x	x	XX	x	
UN Habitat	x	x	x	x	XX	XX	
Commercial partners							
Coca Cola India & Nepal					XX	XX	Using of local infrastructures

Table 23. continued.

Institution	Time						Comments
	2004/ 05	2005 /06	2006/ 07	2007/ 08	current 2009	future 2010	
Piyush production & marketing	XX	XX	XX	XX	XX	XX	Chlorination product
SODIS bottle production					XX	XX	Test of new bottles
Solvatten					XX	XX	Test of device

Note: x = without ENPHO involvement, XX = with ENPHO involvement, X = with Eawag/Sandec and Enpho involvement, XX = current project with Unicef & DWSS, XX = current project with UN Habitat, Coca Cola and several municipalities.

8.1 Local NGOs

Out of seven NGOs which were involved in SODIS/HWTS projects with Eawag/ENPHO during 2004-2006, four we were able to interview. Out of these four, three stated to still have HWTS as an active topic on their agenda. Two follow the approach to promote SODIS/HWTS during their regular activities whenever possible. Surely, not with the same intensity as during the project time, but neither did the message get lost completely. However, none of these two organizations has its core focus on HWTS. The third organization is just getting back into the HWTS topic, but with a focus on only chlorination.

All three rated the previous projects as successful during project time, however, the time frame was too short, as were the allocated financial resources, and follow up from ENPHO was missing. Two stated to wish more contact and information on HWTS.

The fourth interviewed NGO remains inactive since some time. Also the remaining three NGOs which were not interviewed are said to be inactive at the moment or non-existent anymore.

Overall, at least in two of the NGOs further dissemination of SODIS got installed on the long term, although allocated time resources are limited. However, interest was explained in continuing and if there was a project, also intensifying their efforts.

8.2 Governmental institutions

Governmental institutions in comparison to NGOs have the advantage of a greater spatial coverage. Whereas an NGO usually works in some selected communities, governmental institutions may cover entire districts. Moreover, governmental institutions are sure to be sustainable as an institution itself, whereas NGOs may disappear or be inactive if no projects are under way. On the other hand, governmental institutions usually have larger structural bodies, which can cause more bureaucracy and may sometimes be hindering.

8.2.1 Municipalities

Seven municipalities have been involved in SODIS/HWTS projects with Eawag/ENPHO after 2005 until now. The target population of municipalities lives in urban areas. Interviews were carried out with the four municipalities that had been involved in past projects. Three additional municipalities only started being involved very recently (2008) and were therefore not interviewed.

The units that were involved in HWTS promotion are the Community Mobilizations Unit, the Community Development Unit, or the Public Health Section of the municipality. In case of the larger municipalities, also the target population was quite large (5.000-10.000 households). However, staff counts in the mentioned units were rather low (around 2 to 6), but the number of coordinated promoters quite high (20 to more than 100). Two of the municipalities employed so called city volunteers as their promoters (young students working a limited time for little money), two worked with women groups, and two with health workers. As the NGOs, also the municipalities rated the project as successful during project time, but time and often money were not perceived as sufficient.

Out of the four interviewed municipalities, one has always had a focus on water disinfection during the rainy season; however, it has been mostly about giving out free chlorine to squatter areas. Now they also give information on other HWTS in case interest is shown. Two other municipalities are planning to have projects in the near future where SODIS will be a part of the solid waste management program. The fourth municipality is still actively involved in HWTS promotion within an ongoing project, as well as the three municipalities which got only involved during the most recent project. ENPHO will keep its focus on working with municipalities in urban areas, since UNICEF has a strong focus on rural areas.

Summarizing, municipalities can move quite a large population. However, if no external projects are initiated through providing of resources, sustainability is limited. As for the NGOs, SODIS/HWTS can only be a part of another program with limited time spent on its promotion.

8.2.2 Ministry of Health – District Public Health Organizations (DPHOs)

During project phases 2006-2008, ENPHO worked together with three District Public Health Organizations (DPHO), which are sub-units of the Ministry of Health on district level. All three of them were interviewed.

The basis of a DPHO are so called Female Community Health Volunteers (FCHV). They are volunteers, mostly women, responsible for a certain number of families in their community and have the task to inform and visit families about current health issues. This system makes it very effective to spread new messages to entire populations, because FCHV exist in each village and every family is assigned to be the responsibility of one FCHV. So, also during the SODIS/HWTS projects, the promoters were FCHV. However, one drawback of FCHV is their bottle neck function, because all health messages are expected to be transferred to the target population by them. Additionally, they only receive small incentives, as their work is voluntarily. Nevertheless, the number of families they are in charge of may be quite high and they are expected to visit them monthly. In consequence, SODIS/HWTS promotion took place during the time of the project, because some incentives were provided, but after project end the topic is likely to be dropped. Two of the DPHOs stated that SODIS/HWTS is still part of the refresher meetings (3x per year), one is maybe going to revive SODIS/HWTS promotion within the frame of a childhood illness program, which will be (partly) implemented by ENPHO.

Summarizing, at the organizational level of the DPHOs sustainability is given, however, if there are no funds, it may as well not get much attention by the FCHV, as it was reported by the interviewed FCHVs themselves.

8.2.3 Department of Water Supply and Sewerage (DWSS)

The DWSS, mainly responsible for hardware installations all around water provision and treatment, also runs promotion of household water treatment as an own initiative as part of their awareness program in areas where no safe water can be provided yet and also as part of their disaster preparedness training. In the latter program, more focus is laid on chlorination, because it is easier to be supplied during flooding. Within the awareness program, all four HWTS options are promoted (boiling, filter, chlorination, and SODIS) using local channels like Village Development Committees (VDC), mothers groups, FCHV (see above), local NGOs, and schools. ENPHO as well as other NGOs are involved as technical support. Larger funding agencies use the sub-units of the DWSS as replicators on the district level. Together with the WHO, a water safety plan was set up. Within the National Drinking Water Steering Committee, water quality standards are set and quality goals are defined. Together with Unicef, ENPHO and others, standardized education materials were developed that may be used by everyone working in the HWTS sector. Most importantly, these education materials carry the label of the government.

The DWSS is very active within the topic of HWTS/SODIS promotion and a high degree of sustainability was achieved with this stakeholder. One drawback – but this may apply to all governmental institutions – is the low level of cooperation for example with the Ministry of Health regarding the work of the FCHVs or with the Ministry of Education regarding activities on school level.

8.2.4 Ministry of Education

During the project phase 2006/07, ENPHO worked together with one Education Training Center (ETC) on a regional level. ETCs are responsible for training the teachers. This one ETC covered 11 districts with 300 governmental schools per district. During the project, SODIS was disseminated to teachers within the teachers training program. In consequence, in some schools HWTS/SODIS activities were launched, but not in all schools. However, as a consequence of this project, SODIS got included in the water treatment curriculum of the teachers, which exists since a long time but so far had only included boiling, chlorination and filtration.

After the project, it happened that two people who had been working in that particular ETC were shifted to 1) the Curriculum Development Center (CDC), and 2) the National Center for Educational Development.

The CDC is responsible for the contents of all school curricula, textbooks, and quality control in schools. The interviewee in its function as a science expert already achieved that SODIS got included briefly in the primary level schoolbook and is very likely to be soon included more in detail in the lower secondary curriculum. Although these guidelines officially only apply to governmental schools, also private schools consult the CDC for approval of their schoolbooks.

The National Center for Educational Development is directly above and in charge of all the country's ETCs. They formulate education policies, they are responsible for the development of all human

resources under the Ministry of Education and within that, define teachers trainings. There SODIS was already included. In a next step, SODIS should be included in the HWTS curriculum of the trainers training (those who train the teachers). It is expected that the information is cascaded down from trainers to teachers to the children to their parents. However, it was mentioned by the interviewee that for the inclusion of HWTS/SODIS in future teachers training, some emphasis and effort of ENPHO as a technical partner would be very welcome.

Interestingly, out of the cooperation with one regional ETC an impact on a higher level was achieved. So, it is viewed very positively that SODIS/HWTS are included in the children's curricula as well as the teachers' training. However, it should be noted that orientation on school level about HWTS may not be enough to initiate behavior change at household level. Moreover, reinforcement seems to be necessary at the central as well as at the regional level. At the district level, a collaboration with one District Education Office has already started.

8.3 International agencies

The two international organizations most strongly involved in HWTS are Unicef and UN Habitat. ENPHO is a technical partner of both.

Unicef is more focused on rural areas and currently has evaluated a campaign of HWTS and hand-washing promotion in several countries. In Nepal, Unicef promoted together with the DWSS and ENPHO all four water treatment options in more than 200 schools in four rural districts. Based on these results, up-scaling activities are expected to take place in the near future.

UN Habitat has a commitment to include a HWTS component in every project they have. However, impact is sometimes barely visible and one perceived problem is that awareness may be easy, but not behavior change. Also, drop out behavior is far too little understood and people seem to be lazy. As for SODIS, bottles are often a problem, the image of a poor-men's no-cost technology is not exactly appealing, and the plasticizer issue keeps coming back every once in a while. In general, local partners should have a strong network at grassroots level and SODIS/HWTS should be integrated into other programs to sustain it even after project end.

At the moment, a big collaboration project with UN Habitat, Coca Cola, and several municipalities in urban areas is being realized, where ENPHO is involved as a technical partner. UN Habitat recommends for ENPHO – as they do not have a strong network at grassroots level – to focus on their technical expertise as well as on follow-up activities at stakeholder level.

Overall, two international agencies are very active in HWTS promotion. The fact that SODIS is part of the promoted HWTS options is at least partly due to the long-time engagement of ENPHO in the promotion of SODIS in Nepal. Also, due to ENPHO's long standing expertise in the HWTS topic, they frequently get consulted within the HWTS promotion projects as technical partners (providing trainings and expertise).

8.4 ENPHO

Finally, an interview was conducted with ENPHO about the organization and their activities related to HWTS.

ENPHO exists since 1990 and works in the water and sanitation sector. They always follow a 3-step-approach: research – pilot projects – up-scaling. HWTS promotion is currently in the third, the up-scaling process.

According to their work focus, two program units exist: water quality and sanitation. In addition, a lab and a resource center (like a library) are run. Within the water quality unit, there are several foci: technical partnership in HWTS promotion projects, product development (SODIS bottle, chlorination product, Solvatten), social marketing with local entrepreneurs, and exploring other means of SODIS/HWTS promotion (private sector, schools, radio/TV). Within HWTS promotion, ENPHO has employed or still employs partnerships with all the aforementioned institutions. For a better distinction between former and current collaboration, also see Table 23.

Within the sanitation unit, ENPHO works in the areas of sanitation installations in schools and communities, outdoor and indoor air pollution, water pasteurization with improved cook stoves, wetland construction for wastewater treatment, solid waste, and previously Ecosan toilets.

Summarizing, during the first project phases, ENPHO collaborated with local NGOs. Out of these seven, two still expressed a certain amount of commitment to HWTS/SODIS promotion within their ongoing activities.

Later, collaboration focus was shifted to governmental institutions, such as municipalities, the health and education sector. Municipalities continue to be important partners, because current promotion activities focus on urban areas. DPHOs (health sector) are not partners anymore at the moment, because they work in rural areas which are now targeted by Unicef. It was observed that if a municipality or DPHO does not receive follow-up funding and impulses after a project phase has ended, sustainability is limited. One direct collaboration with the education sector by luck turned out to have long-term impact on the national curriculum development activities. Education to the future generation is viewed to be a good entry point to long-term effects; however, it has to be considered that awareness alone does not make behavior change.

Independently, the DWSS, Unicef and UN Habitat have launched large scale activities in the HWTS sector with ENPHO also being involved as a technical partner.

Overall, at the moment, HWTS and SODIS are considered to be well integrated into the important institutions working in the HWTS sector. Particularly, the integration of SODIS in all HWTS promotion campaigns is to a large part due to the efforts of ENPHO during the last years, providing evidence that SODIS works (lab studies) and pilot field experiences with the promotion of SODIS.

Further efforts should be made to more efficiently use the large grassroots structures provided by the municipalities and the health sector. Here more effort seems to be needed to make decision makers aware of their own responsibility, reaching beyond temporary, externally financed projects. Within these efforts, possible collaborations and synergies between different governmental institutions should be pointed out and made use of.

9 Summary of results and conclusions

To analyze the sustainability of projects that had been carried out by ENPHO with funding from Eawag, information was gathered at various levels: households, promoters, and institutions. At the household level, quantitative questionnaires got applied, collecting information on current water consumption behavior and habits. At promoters' and institutional level, information about previous project implementation was gathered in a more qualitative way. In addition, current activities and commitments with regard to HWTS promotion were investigated. The following part presents summaries and conclusions of the results.

9.1 Household level

9.1.1 *Safe water consumption*

Half of the investigated sample consumes entirely safe water, treated by either filter, SODIS, chlorination, or boiling. A small part also bought water for their consumption. However, half of the sample still consumes untreated water – one third relies exclusively on untreated water, the others consume one part treated water but one part is still consumed untreated. Out of the treatment options, filtering is the most popular method used by one third of the overall sample. The second most popular option is treatment with the SODIS method, as used by 21% of the people. Boiling (12%), buying water (7%) and chlorination (4%) are the other options used.

Safe water consumption – measured as the percentage of people of the sample only consuming safe water – was positively influenced by a higher education level, but not by any of the other demographic indicators like age, if there are children below 5 years of age in the family or socioeconomic status.

9.1.2 *SODIS water consumption*

As mentioned above, 21% of the sample used SODIS. Out of these, half were regular (14%) and half irregular (13%) SODIS users. Irregular SODIS users could be further split up into half currently using SODIS but not daily (7%) and half only using it during the right season, but not at the moment (6%). Most notably, irregular SODIS users are almost twice as likely to consume untreated water compared to regular SODIS users. So, regular SODIS use supports being a safe water consumer. If SODIS is used only irregularly, people are also around twice as likely as regular users to combine SODIS with another water treatment option.

SODIS use – measured as the percentage of people consuming SODIS water – was not influenced by any of the assessed demographic indicators. In contrast to overall safe water consumption, higher education does not facilitate SODIS use. It seems that education sensitizes people that they should treat their water but which method they finally chose is not related to education.

9.1.3 Safe water consumption and SODIS water consumption in the different investigated areas

Relating safe water consumption as well as SODIS use to the different investigated areas – characterized by promotion phase, implementing organization, urbanization, and income level – the following was found:

In all urban areas, NGOs and municipalities are equally effective in promoting safe water consumption (SWC) and SODIS water. Across all three districts with urban areas (Lalitpur, Kathmandu, and Thimi), the level of SWC is about two thirds (63%) of the sample and 30% are using SODIS.

In rural areas, the sub-unit DPHO of the Ministry of Health is more effective than NGOs in promoting SWC and SODIS. SWC percentages are about two times higher with DPHO promotion (63%) than with NGO promotion (26%). For SODIS use, the difference is even more pronounced – the DPHO achieved four times as many (48%) SODIS users compared to the NGO (11%). However, the DPHO was the implementing partner in one area only, so this positive experience is not based on a large sample and should be repeated before further conclusions can be drawn.

In the urban areas of Lalitpur and Kathmandu are very similar, quite high percentages of SWC were found (76%). Since Lalitpur and Kathmandu are similarly urban and right next to each other, this result was not surprising. However, regarding SODIS use, Kathmandu shows a tendency to higher percentages of SODIS users (41%) compared to Lalitpur (31%). It seems that in Lalitpur other water treatment options are preferred compared to Kathmandu, since percentages of SWC are equally high.

In contrast, the urban area of Thimi is different to the urban areas of Lalitpur and Kathmandu regarding SWC (29%). Near Thimi, a water treatment plant got installed only recently, so people believe their water is clean. However, this may or may not be true, since the quality of the pipe system is usually quite bad. With regards to SODIS use, Thimi urban areas seem to be equal to Lalitpur urban areas.

The rural areas of Bhaktapur and Lalitpur are also quite similar; however SWC was only half as high as in the urban areas of Lalitpur and Kathmandu (36% compared to 76%). Similarly, SODIS use is also somewhat lower than in Kathmandu and Lalitpur (21% compared to 41% and 31%, respectively).

In general – apart from Thimi – urban areas have twice as many SWC than the rural areas. This would also apply for SODIS use, except for the SODIS promotion via the DPHO, which seems to have been equally effective like the promotion in urban areas. So for SODIS use, the relation to the degree of urbanization cannot be fully disentangled with the current data.

The promotion phase (year of promotion activities) as well as the income level do not seem to have an influence on SWC or on SODIS use.

9.1.4 Influences of the promotion campaigns on SODIS water consumption

Main information sources from where people had heard about SODIS were group training (38%), TV/radio (31%), other people (19%), promoters during household visits (10%) and other sources (all below 10%). On average, people named one information source where they had heard about SODIS.

Disturbing is the fact that not even half of the sample mentioned the group training as an information source and only 10% mentioned household visits, although in all areas several trainings were conducted as well as household visits performed. For the household visits, one explanation may be that the group training as an event got remembered much more easily than the household visits. Nevertheless, the numbers seem quite low.

The various information sources showed some influences on SODIS use. The chances of being a current SODIS user (regular or irregular) were only increased by the sheer number of information sources, but not by any particular information source. However, chances that someone initially tried out SODIS (independently if they stopped again) were increased by having participated in a group training or having had a household visit by a promoter. Even stronger, the same information sources (training and household visits) also proved to be supportive for people becoming a regular SODIS user in comparison to only being an irregular SODIS user. It seems that the trainings and household visits are good to initiate the use of SODIS, but not to sustain it, especially when only used irregularly. Preventing people to stop SODIS use once they have started should be the focus of future promotion campaigns.

TV and radio actually decreased the chance of people trying out SODIS – certainly this type of information is not sufficient to initiate a new behavior.

Unexpectedly, perception of any of the information sources did not explain why some people consume only safe water whereas others don't.

In addition to information, people were given materials to take home. However, only 26% of the households reported to have received such material (poster, flyer, calendar, or bottle). No relation of having received some kind of material to SWC or SODIS use were found, which may be attributed to the low number of materials given out in the first place. Also, it is unlikely that people have kept these materials until the time of investigation.

9.1.5 Reasons to stop and problems with SODIS use

If people mentioned that they had started using SODIS because of the promotion campaign (60%), this did not make a difference between relapsers (those who stopped again) and continuous SODIS users. However, if people started SODIS because they were concerned about their health (and were convinced SODIS would contribute to their health; 11%) or because the method convinced them as such (6%), they were more likely to stay with SODIS use. It seems that if people start a behavior based on their decision rather than external influences like promotion activities, other people or the media, they are eventually more likely to stay with the behavior.

People that had stopped using SODIS after a while expressed problems with SODIS being largely related to the daily execution of the SODIS behavior. People feel a lack of time (18%) and habit (13%), they feel bored (12%), find it difficult (6%), or don't like the taste/smell (6%). Less often, resource related problems were named, such as missing bottles (10%), missing space to expose the bottles, missing sun or water (8%), or preference of another method (3%). This can be interpreted positively, because the behavior related reasons can more directly be influenced by behavior change interventions. For example, a better planning of when to prepare the SODIS bottles can reduce the perception that time is lacking, or habit can be supported with small reminders placed in people's households.

9.1.6 Motivations and habit aspects guiding water consumption behavior

Models explaining human behavior stress several motivations or groups of factors influencing the performance of a behavior. Main motivational factors commonly investigated are related to risk

awareness and already existing health related behaviors, attitude, social influences, availability of necessary resources, intention, and aspects of habit.

Current hygiene behavior and risk awareness are found to be quite positive in the investigated sample: the observed hygiene status of the families is above average, hygiene behavior (brushing teeth (1x day), hand washing and using soap for hand washing) is well developed, and the perception of severity of diarrhea is high. Two causes of diarrhea in children could be named on average. However, hygiene behavior shows no or little influence, risk awareness none at all on any of the water treatment intentions.

Similarly, the factors related to carry out a specific water treatment behavior got quite positive ratings. Resources are perceived to be mostly available (bottles, gas, filter), rational attitude (perceived monetary and time costs) and emotional attitude (liking of the water type, perceived taste, and health benefit) are medium to high, social reputation is around medium, and the perceived social norm reflects real user percentages quite well. For untreated water, the emotional attitude is much lower than for the treated water types, and the social reputation is negative, which means that people consider untreated water, especially within their social context, as worse than treated water. The stated future intentions for the treatment options are above current behavioral levels, for untreated water the intention is lower than the current behavioral level. This nicely indicates that overall more treated and less untreated water is intended to be consumed in the future.

However, intentions to boil, filter, do SODIS, and consume untreated water are mainly only influenced by two factors: the emotional attitude and the social norm. Emotional attitude is expressed as liking, perceptions of the taste and health benefit of the respective water type. Social norm is the perception or estimation of the interviewed person of how many other people in ones own community consume a certain water type. So, in contrast to what one would expect, the rational attitude aspect, expressed as the judgment of time and money costs related to the water disinfection method (untreated water does not involve extra money and time costs), and the perceived availability of resources do not play a role in developing a positive intention.

In addition to the two factors mentioned (emotional attitude and social norm), for developing a positive SODIS intention the perceived change of social norm since the last SODIS promotion activities, i.e. the perception if there are more or less people using SODIS at the time of investigation compared to the time of project end, played a significant role. A weak influence on intention was also found for knowledge of SODIS.

All water consumption behaviors are strongly influenced by the respective intention and habit. The more positive the intention and the perception of habit, the more likely is a family to consume a certain water type. For SODIS use, communication about SODIS was also investigated and proofed to influence SODIS use positively.

For the SODIS behavior, habit was looked at in more detail. It was found that for differentiating irregular and regular SODIS user, the aspects of automaticity of the behavior execution (i.e. preparing the bottles), perceiving the preparation of SODIS as a daily routine and already in place since a long time, as well as preparing the bottles daily at the same time are important factors to make SODIS use a regular behavior. It is suspected that these factors would also play a role for any water treatment option to be used on a regular basis.

9.1.7 Sustainability at household level

Overall, the achievement that half of the sample is entirely consuming safe water can be viewed as a big success. Also, 27% SODIS users in project areas up to 5 years after the end of the project intervention is viewed as quite successful. In the end, the goal was and is to make people consume safe water, no matter which water treatment they use. Filter and SODIS have proven to be a sustainable solution for a significant part of the population.

The biggest part of the success was achieved in the urban areas of the big cities Kathmandu and Lalitpur – some areas are almost free of the consumption of untreated water. In rural areas, people still tend to believe their water is clean and does not need to be treated. Also in the case of new water treatment installations, people tend to believe in the complete effectiveness of these installations with regard to water disinfection. In both cases – rural areas and new water treatment installations – the water may indeed be safe to drink directly from the source; however, in rural areas agricultural contamination and in general the devastating state of water pipes in Nepal do not allow for the same assumption for the water that finally reaches people's homes. Here, more promotional work is needed to make the consumption of untreated water an undesirable and uncommon option, and to provide alternative solutions such as filters or SODIS.

Promoters and household visits have proven to be successful promotional strategies, making people to try out SODIS. Once people are using SODIS, promoters and household visits are supportive in achieving regular SODIS use. However, the problem of many people starting water treatment but then stopping it again still has to be tackled to achieve higher sustainability. For example, the motivations that were found to be influential for an intention towards a certain water treatment option and the related habits have to be addressed more explicitly within promotion campaigns. Creating positive emotions, stimulating social influence and social exchange is needed. Activities should be initiated where people experience fun (i.e. group games), they have to be given the chance of tasting treated water, and they have to be convinced of the positive health impact of treated water. In addition, people should be made aware of how many other people are already using water treatment options in their (or similar) communities; stimulating communication among people would be a good measure. This will support them in their decision to use one or more water treatment options, and that they actually start trying it out. Once they started, they actively have to be supported in establishing a regular daily routine to prepare the water. People should be requested to think of and actively stick to a daily routine when they prepare the water each day. Habit development could involve regular household visits less frequently but for a longer time than it was done previously, as well as conducting discussion rounds about experiences and difficulties during the daily preparation of drinking water. Another simple method to support habit development is memory aids that are placed inside the houses.

9.2 Promotion activities

The standard promotion strategy applied was to first give a training to the promoters (TOT). After that, the promoters carried out group trainings to around 25 people and introduced them usually to all 4 HWTS options (boiling, filtration, chlorination, and SODIS). In some cases, households also received individual training, street dramas were performed, and schools were visited. The group trainings are viewed as more time-efficient than individual trainings and can be recommended for future campaigns. It seems to be an advantage to present SODIS/HWTS in combination with another topic like waste management, for example. Very noteworthy is the finding that providing bottles (mostly for free) directly to the households after the trainings resulted in lower percentages of users and higher percentages of relapse (many households stopped SODIS). This may be explained with the

lacking necessity of households to integrate bottle supply into SODIS use from the beginning. Once the given bottles were damaged, they stopped.

As a follow up and monitoring strategy, households were visited one by one during the months after the group training. Certainly, monitoring is a good tool to support people's development of a new behavior. The longer the monitoring period, the higher was the sustained SODIS use. However, the frequency seems to be too high – the lower frequencies of monitoring finally achieved higher percentages of SODIS user and less relapse.

The promotion strategy (training + monitoring) seems to be accepted and liked by both, the households and the promoters, and should be continued. If possible, one water test for each area should be provided to easier convince people. Additionally, it seems that older female promoters are more accepted, because they correspond to the target group. This should be taken into account when selecting promoters, and maybe a young one should work in a team with an older one.

Lacking or inadequate incentives are not only disagreeable for the promoters but also seem to result in lower motivation of the promoters to promote HWTS/SODIS. This in turn shows a direct correlation to lower SODIS use and more relapse. It is therefore recommended to increase the promoters' motivation by providing adequate incentives, depending on their workload. This does not necessarily imply monetary payments, also work certificates or some kind of public recognition would surely be appreciated. Additionally, we see some improvement potential for motivating the promoters with a better organizational support.

9.3 Institutionalization

Several partners were involved in implementing SODIS/HWTS projects in Nepal: local NGOs, municipalities, District Public Health Organizations (DPHO) and an Education Training Center (ETC). Out of these projects, different levels of commitment and activities related to HWTS promotion arose.

Out of seven local NGOs having promoted SODIS/HWTS during 2004-2006, two continue to promote SODIS whenever possible within their ongoing activities, although allocated resources are very limited. Three NGOs are unfortunately not active anymore; two did not report any type of activity related two HWTS.

Quite similarly, also within municipalities only limited resources can be allocated to HWTS promotion and only within ongoing activities if no external funding is available. However, if activated, municipalities are able to reach quite large populations and work as effective as NGOs. Nevertheless, when working with young city volunteers as promoters, some improvements have to be made in establishing them in the communities and incentivizing them.

Not surprisingly, also by the formerly involved District Public Health Organizations (DPHOs) the same problem was reported: interest in more projects with HWTS focus exists, but funds need to be allocated to remunerate the promoters, the Female Community Health Volunteers (FCHV). Since the work of the FCHVs is voluntarily, they demand incentives for their work.

One independent, active stakeholder within the topic of HWTS/SODIS promotion is the Department of Water, Sewerage and Sanitation (DWSS), which runs own HWTS promotion activities within its awareness program. Sub-units of the DWSS are also partnering with international organizations as the implementing unit within large scale projects.

Another important governmental stakeholder, the education sector, was also won over to HWTS and SODIS promotion. Currently, the four HWTS options (boiling, chlorination, filtration, and SODIS) are included in the primary level curriculum; the more detailed inclusion in the lower secondary

curriculum is under way. In addition, the HWTS topic was also included in the teachers training and will probably still be part in the future teachers training.

Apart from the governmental institutions, two big international agencies (Unicef and UN Habitat) are currently active in HWTS promotion in Nepal. Their projects involve governmental institutions as implementing partners, and in one case also private partners are involved. Due to ENPHOs long standing expertise in the HWTS topic, they frequently get consulted within HWTS promotion projects as technical partners (providing trainings and expertise).

In addition to HWTS promotion, ENPHO also follows other activities related to water and sanitation and therefore has quite a diverse working focus. This is viewed to be very positive since it broadens ENPHOs partner network, it opens possibilities to combine different topics and make use of synergies (i.e. every sanitation project has a HWTS component).

9.3.1 Sustainability at institutional level

Many organizations are involved in HWTS promotion or at least it is within their scope of interest. The fact that SODIS is now always part of the promoted HWTS options is at least partly due to the long-time engagement of ENPHO in the promotion of SODIS in Nepal. So the effort of having had several pilot project phases has paid off and made the SODIS method accepted as an equal method among the other HWTS options.

Governmental institutions have proven the same or higher effectiveness as the involved NGOs in promoting HWTS, which can be taken as a very positive sign towards further collaborating with municipalities and DPHOs since they have a much larger network at grassroots levels. Here an important potential lies to achieve better sustainability at household level: certainly, a longer time frame of follow-up would increase sustainability at household level, as it was often mentioned by the promoters and institutions; however, resources are usually limited to the duration of a certain project. An important feature of governmental institutions is their permanent presence, whereas NGOs may come and go. Consequently, ways must be found to commit governmental institutions to permanently have HWTS on their agenda, and not only during limited, externally funded projects. If this can be achieved, one would possibly be able to secure infrequent follow-ups in previous project communities without much effort and additional resources. ENPHOs role should be to follow up on these governmental institutions and, with their expertise, develop efficient monitoring plans. Moreover, the potential to collaborate, share efforts and use synergies among the municipalities, health, water and educational sector must be elaborated and actively used.

10 Annex

10.1 Household questionnaire

Sustainability Study Nepal – Questionnaire Households

1

परिचय *Introduction*

नमस्ते मेरो नाम हो । म एन्कोमा काम गर्छु (एन्कोमाको परिचय दिने) । वामीले खानेपानी सम्बन्धी अध्ययन गर्दैछौ र यही अध्ययन अन्तरगत सर्वेक्षणको लागि आएको हुँ । यी प्रश्नहरू समुदायको अन्य सदस्य र अरु समुदायमा पनि गर्नेछौ । यो अन्तरवार्ताको नतिजाले तपाईंको समुदायमा केही सुधार ल्याउन सकिन्छ भन्ने आशा लिएको छु । आजको छलफल करिब ३०-४५ मिनेटको रहनेछ ।

Please introduce yourself!

Hello, my name is and I am working for ENPHO (explain ENPHO, if you like). We are conducting a research study on household water consumption. If you don't mind, I would like to interview you about your water consumption preferences. It will take about 30-45 minutes. Do you have the time for the interview? We are also interviewing other households in your community as well as other communities in the valley. The results will be treated anonymously and we are aiming at improving the situation in your community.

अन्तरवार्ता सम्बन्धी सामान्य कुराहरू

अन्तरवार्ता शुरू गरेको समय:

General information regarding the interview

Start time:

१०१. फारम नं Form number :

१०२. अन्तरवार्ता लिएको मिति Date of the interview :

१०३. अन्तरवार्ता लिने व्यक्तिको नम्वर Name and number of the interviewer :

१०४. गा.वि.स वा नगरपालिका/वडा नं /जिल्ला/समुदाय Village/District/Community

उत्तरदाता सम्बन्धी तथ्याङ्क *Data of the interviewed person*

१११. तपाईंको नाम के हो ? Name (if they refuse, no problem):

११२. तपाईं कति वर्ष हुनुभयो ? Age:

११३. तपाईंको भाषा के हो ? Language:

११४. लिंग : ¹ महिला ² पुरुषGender: ¹ female ² male

११५. तपाईं के काम गर्नुहुन्छ ?

¹ छैन² गृहिणी³ कृषि⁴ अनौपचारिक काम⁵ औपचारिक काम⁶ स्वोच्छेदक⁷ पढाई⁶ अवकाश⁹ अन्यJob: ¹ none² housewife³ agriculture⁴ informal employment⁵ formal employment⁶ independent work⁷ studies⁸ retired⁹ other:

११६. शिक्षा : (कति वर्ष सम्म विद्यालय र विश्वविद्यालय पढ्नु भयो ? Education (years in school AND university):

घरघुरी तथ्याङ्क *Data of the household*

१२१. तपाईंको घरपरिवारमा कति जना सदस्यहरू छन् (जम्मा)? Number of persons (TOTAL):

१२२. ५ वर्ष अथवा ५ वर्ष गुनिका बच्चाहरू कति जना छन् ? Number of children < or = to 5 years of age:

१२३. ६ देखि १४ वर्ष सम्मका बच्चाहरू कति जना छन् ? Number of children between 6 and 14 years:

१२४. तपाईंको बच्चाहरू मध्ये माथिल्लो स्तरसम्मको शिक्षा कति छ ? *Highest education of kids:*

१२५. परिवारहरू बसेको कोठाको संख्या (भान्सा कोठा र बमथरुम बाहेक)

125. *Number of rooms in which the family lives* (without bathroom and small kitchen):

स्वास्थ्य सम्बन्धी जनचेतना *Health status and awareness*

१२९. वित्तको २ हप्ता भित्र तपाईंको कति जना सदस्यहरूलाई भन्नापखाला लागेको थियो ?

131. *How many of the family members had diarrhea during the last 14 days?*

१२२. तपाईं दिनमा कति पल्ट दाँत माफ्नु हुन्छ ?

132. *How often do you brush your teeth per day?*

१३३. तपाईंले आफ्नो र परिवारको स्वास्थ्यको बारेमा जिम्मेवारी लिन' भएको छ ?

लिनको छैन लिनकोछ

133. *Do you feel responsible for your own and your family's health?*

not at all very much

१३४. तपाईं र परिवारको अन्य सदस्यहरूले खाना खानु अघि र दिशा गरिसके पछि कति पटक हात धुनुहुन्छ ?

0% - धुँदैन 25% - कहिलेकाँही 50% - आधा आधा 75% - धेरै जसो धुन्छ 100% - सधैं

134. *How often do you and your family wash your hands before eating and after the toilet?*

0% = (almost) never 25% = sometimes 50% = half-half 75% = often 100% = (almost) always

१३५. तपाईं र परिवारको अन्य सदस्यहरूले दिनमा कति पटक साबुनले हात धुनुहुन्छ ?

0% = धुँदैन 25% = कहिलेकाँही 50% = आधा आधा 75% = धेरै जसो धुन्छ 100% = सधैं

135. *How often do you and your family use soap (or an equivalent) when you wash your hands?*

0% (almost) never 25% sometimes 50% half-half 75% often 100% (almost) always

१३६. तपाईंको विचारमा भन्नापखाला बालबालिकाहरूको लागि डर लाग्दो रोग हो कि होइन ?

एकदमै डर लाग्दो डर लाग्दो होइन

136. *How dangerous is diarrhea for young children?*

very dangerous not dangerous

१३७. तपाईंको विचारमा भन्नापखालाले काम गर्ने शक्तिमा ह्रास आउँछ कि आउँदैन ?

धेरै आउँछ आउँदैन

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१४६. भान्साकोठाको सरसफाइ ^९ मूल्याङ्कन गर्न नसकिने
सामान्य भन्दा एकदमै फोहोर सामान्य सामान्य भन्दा एकदमै सफा
146. **Cleanliness of the kitchen:** ^९ not observable
a lot dirtier than average average a lot cleaner than average
१४७. घरको वरिपरिको सरसफाइ (जस्तै : बगैँचा, करेसा बारी आदि) ^९ मूल्याङ्कन गर्न नसकिने
सामान्य भन्दा एकदमै फोहोर average सामान्य भन्दा एकदमै सफा
147. **Cleanliness of the immediate surroundings of the house (e.g. backyard, garden):** ^९ not observable
a lot dirtier than average average a lot cleaner than average

हाल परिवारले खपत गरेको खानेपानीको अवस्था **Current water consumption of the family**

१४९. तपाईंको परिवारको खानेपानीको मुख्य श्रोत के हो ? (एउटा वा दुईमा मात्र चिनी लगाउनुहोस्)
- ^१ असुरक्षित ईनार ^२ सुरक्षित ईनार ^३ ट्यूबवेल ^४ धारा
^५ अकाशो पानी ^६ नदीखोला ^७ किनेको पानी ^८ अन्य.....
151. **Where does most of your drinking water come from (origin)?** (only 1-2 crosses)
- ^१ unprotected well ^२ protected well ^३ borehole ^४ tap
^५ rainwater ^६ river or lake ^७ bought water ^८ other:
१५२. तपाईंलाई कस्तो किसिमको पानी मनपर्छ ? (एउटामा मात्र चिनी लगाउनुहोस्)
- ^० अशुद्ध पानी ^१ तताएको ^२ सोडिस ^३ किनेको पानी ^४ पियूष
^५ वाटरगार्ड ^६ सि.एस फिल्टर ^७ बायोस्याण्ड फिल्टर ^८ क्याण्डल फिल्टर
^९ अन्य
152. **Which water type do you like the most?** (only 1 cross)
- ^० untreated ^१ boiled ^२ SODIS ^३ bought water ^४ Piyush
^५ Water Guard ^६ CS filter ^७ Bio-sand filter ^८ candle filter
^९ other

तपाईं खानेपानी कुन तरिकाबाट शुद्धिकरण गर्नुहुन्छ र के नियमित गर्नुहुन्छ ?

→ अन्तःवाताकृत/आफूले नियमित वा अनियमित प्रयोग गर्नु भएको सबैमा चिनी लगाउनुहोस्

Which type of water does your family consume and how regularly?

→ Interviewer: Cross all water types the family is consuming more or less regularly.

तपाईं र अन्य परिवारले पिउने गरेको खानेपानी शुद्धिकरण तरिका ... <i>Did you or your family drink...</i>	... पछिल्लो २ हप्तामा <i>...in the last 2 weeks?</i>	हप्तामा कति दिन ? <i>How many days per week?</i>
	^a	^b
१६१. • स्रोतबाट सिधै पिउने • water direct from the source (untreated)	^१ <input type="checkbox"/> हो ^० <input type="checkbox"/> होइन ^१ <input type="checkbox"/> yes ^० <input type="checkbox"/> no	
१६२. • उनालेको पानी (जस्तै: कफी, चिया आदि) • boiled water (like coffee, tea etc)	^१ <input type="checkbox"/> हो ^० <input type="checkbox"/> होइन ^१ <input type="checkbox"/> yes ^० <input type="checkbox"/> no	

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१६३.	<ul style="list-style-type: none"> • किनेको पानी (कोकाकोला, फेन्टा आदि) • <i>bought (water, soft drinks)</i> 	<input type="checkbox"/> हो <input type="checkbox"/> <i>yes</i>	<input type="checkbox"/> होइन <input type="checkbox"/> <i>no</i>
१६४.	<ul style="list-style-type: none"> • फिल्टर पानी • <i>filtered water</i> 	<input type="checkbox"/> हो <input type="checkbox"/> <i>yes</i>	<input type="checkbox"/> होइन <input type="checkbox"/> <i>no</i>
१६५.	<ul style="list-style-type: none"> • क्लोरिन हालेको पानी • <i>chlorinated water</i> 	<input type="checkbox"/> हो <input type="checkbox"/> <i>yes</i>	<input type="checkbox"/> होइन <input type="checkbox"/> <i>no</i>
१६६.	<ul style="list-style-type: none"> • सोडिस पानी • <i>SODIS water</i> 	<input type="checkbox"/> हो <input type="checkbox"/> <i>yes</i>	<input type="checkbox"/> होइन <input type="checkbox"/> <i>no</i>
१६७.	<ul style="list-style-type: none"> • अन्य: • <i>other:</i> 	<input type="checkbox"/> हो <input type="checkbox"/> <i>yes</i>	<input type="checkbox"/> होइन <input type="checkbox"/> <i>no</i>

तपाइको परिवारले खानेपानी शुद्धिकरण गर्ने विभिन्न तरिकाहरु के कति मात्रामा प्रयोग गर्नुहुन्छ ?

→ अन्तरवार्ताकार : मानिसले दिनमा कति कप पानी पिउनु हुन्छ भनेर सोध्ने जस्तै : हिजोकेजयो कति कप पिउनु भयो ?
शब्दमा

→ मानिसले (१ दिन वा १ हप्ता) को जम्मा पिउने पानी खपतको आधारमा प्रतिशतमा सोध्नु होला ।

How much does your family consume of the different water types?

→ Interviewer: Ask the person to estimate in cups per day – take the example of yesterday.

OR

→ You can also ask the person to estimate percentages of total water consumption of 1 day or 1 week.

पानीको प्रकार <i>Water type</i>	कप/ दिन <i>cups per day</i>	प्रतिशत <i>percentages</i>
१६१_c <ul style="list-style-type: none"> • स्रोतबाट सिधै पिउने • <i>water direct from the source (untreated)</i> 		
१६२_c <ul style="list-style-type: none"> • उमालेको पानी (जस्तै: कफी, चिया आदि) • <i>boiled water (like coffee, tea etc.)</i> 		
१६३_c <ul style="list-style-type: none"> • किनेको पानी (कोकाकोला, फेन्टा आदि) • <i>bought (water, soft drinks)</i> 		
१६४_c <ul style="list-style-type: none"> • फिल्टर पानी • <i>filtered water</i> 		
१६५_c <ul style="list-style-type: none"> • क्लोरिन हालेको पानी • <i>chlorinated water</i> 		
१६६_c <ul style="list-style-type: none"> • सोडिस पानी • <i>SODIS water</i> 		
१६७_c <ul style="list-style-type: none"> • अन्य: • <i>other:</i> 		
जम्मा कपहरु	१००%
TOTAL cups	100%

→ यदि तपाईंले खानेपानी शुद्धिकरण गर्नुहुन्छ भने

१६८. तपाईं खानेपानी किन शुद्धिकरण गर्नुहुन्छ ?

→ In case the family consumes TREATED water:

168 Why do you treat your water?

→ यदि परिवारले कुनै पनि खानेपानी शुद्धिकरण तरिका अपनाउँदैनन् भने

१६९. तपाईं खानेपानी किन सिधै पिउनुहुन्छ ?

→ In case the family consumes UNTREATED water:

169 Why do you drink untreated water?

१८२. तपाइको बिचारमा तपाईको समुदायमा कति घरधुरीले असुरक्षित पानी पिउँछन् ?

0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
0% = कुसैले पिउँदैन	25% = कोही	50% = आधा	75% = प्राय सबैले पिउँछन्	100% = सबैले पिउँछन्

183. Please estimate, how many people in your village drink untreated water?

0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
0% = (almost) nobody	25% = some	50% = the half	75% = quite many	100% = (almost) all

१८३. आउँदो महिनासम्म तपाइले कति असुरक्षित पानी पिउने अनुमान गर्नुभएको छ ?

0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	... जम्मा पिउने पानीको खपत
0%	25%	50%	75%	100%	

183. How much untreated water you intend to drink in the near future (next month)?

0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	... of my total water consumption.
0%	25%	50%	75%	100%	

१८४. के तपाइको असुरक्षित पानी पिउने बानी हो ?

बानी होइन	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	बानी हो
	☹	☹☹	☹☹☹	☹☹☹☹	☹☹☹☹☹	

184. Is drinking untreated water a habit for you?

not at all a habit	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	a very strong habit
	☹	☹☹	☹☹☹	☹☹☹☹	☹☹☹☹☹	

१८५. तपाइको बिचारमा असुरक्षित पानी पिउनु राम्रो हो कि होइन ?

एकदमै तरासो	-4 <input type="checkbox"/>	-3 <input type="checkbox"/>	-2 <input type="checkbox"/>	-1 <input type="checkbox"/>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	एकदमै राम्रो
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺☺	☺☺☺	☺☺☺☺	☺☺☺☺☺	

185. How good or bad do you think is consuming untreated water?

it is very bad	-4 <input type="checkbox"/>	-3 <input type="checkbox"/>	-2 <input type="checkbox"/>	-1 <input type="checkbox"/>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	it is very good
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺☺	☺☺☺	☺☺☺☺	☺☺☺☺☺	

उमालेको पानी सम्बन्धी जनधारणा Boiled water attitudes

१९१. तपाईलाई जमालेको पानी पिउन मन पर्छ कि पर्दैन ?

मनपर्दैन	-4 <input type="checkbox"/>	-3 <input type="checkbox"/>	-2 <input type="checkbox"/>	-1 <input type="checkbox"/>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	एकदमै मनपर्छ
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺☺	☺☺☺	☺☺☺☺	☺☺☺☺☺	

191. Do you like or dislike drinking boiled water?

dislike it very much	-4 <input type="checkbox"/>	-3 <input type="checkbox"/>	-2 <input type="checkbox"/>	-1 <input type="checkbox"/>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	like it very much
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺☺	☺☺☺	☺☺☺☺	☺☺☺☺☺	

१९२. तपाईको बिचारमा उमालेको पानीको स्वाद ठिक हुन्छ कि हुँदैन ?

स्वाद ठिक हुँदैन	-4 <input type="checkbox"/>	-3 <input type="checkbox"/>	-2 <input type="checkbox"/>	-1 <input type="checkbox"/>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	स्वाद ठिक हुन्छ
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺☺	☺☺☺	☺☺☺☺	☺☺☺☺☺	

192. Do you think boiled water tastes good or bad?

it tastes very bad	-4 <input type="checkbox"/>	-3 <input type="checkbox"/>	-2 <input type="checkbox"/>	-1 <input type="checkbox"/>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	it tastes very good
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺☺	☺☺☺	☺☺☺☺	☺☺☺☺☺	

१९३ तपाईंको बिचारमा उमालेको पानीले स्वास्थ्यमा असर पार्छ कि पाईन ?

स्वास्थ्यमा असर पार्छ	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	स्वास्थ्यमा असर पाईन
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺	☺☺	☺☺☺	☺☺☺☺	

192 Do you think boiled water is good or bad for your health?

it is very bad for my health	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	it is very good for my health
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺	☺☺	☺☺☺	☺☺☺☺	

१९४ तपाइको बिचारमा पानी उमाल्न धेरै समय र मिहिनेत लाग्छ कि लाग्दैन ?

सगय र मिहिनेत लाग्छ	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	सगय र मिहिनेत लाग्दैन
	☹☹☹☹	☹☹☹	☹☹	☹	☺	

194 Do you think preparing boiled water costs a lot of time and effort?

it is a lot of time & effort	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	no time & effort at all
	☹☹☹☹	☹☹☹	☹☹	☹	☺	

१९५ तपाइको बिचारमा पानी उमाल्न इन्धनको कति खर्च हुन्छ ?

एकदमै महँगो छ	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	एकदमै सस्तो छ
	☹☹☹☹	☹☹☹	☹☹	☹	☺	

195 Do you think combustibles for boiling cost a lot of money?

they are very expensive	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	they are not expensive at all
	☹☹☹☹	☹☹☹	☹☹	☹	☺	

१९७ के पानी उमाल्न इन्धन सजिलै पाइन्छ ?

काहिल्यै पाइदैन	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	सधै पाइन्छ
	☹☹☹☹	☹☹☹	☹☹	☹	☺	

197 Are combustibles easily available?

they are never available	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	they are always available
	☹☹☹☹	☹☹☹	☹☹	☹	☺	

२०४ तपाईंले उमालेको पानी पिउँदा तपाईं प्रति अरुको प्रतिक्रिया के छ ?

एक-दुई नयाँ मित्र	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	धेरै राम्रो सोच्छन्
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺	☺☺	☺☺☺	☺☺☺☺	

201 How do other people think of you if you drink boiled water?

they think very bad about me	<input type="radio"/> -4	<input type="radio"/> -3	<input type="radio"/> -2	<input type="radio"/> -1	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	they think very good about me
	☹☹☹☹	☹☹☹	☹☹	☹	☺	☺	☺☺	☺☺☺	☺☺☺☺	

२०२ तपाइको बिचारमा तपाईंको समुदायमा कति घरघुरीले उमालेको पानी पिउँछन् ?

<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
0% = कसैले पिउँदैन	25% = केही	50% = आधा	75% = धेरै सधैले पिउँछन्	100% = सबैले पिउँछन्

202 Please estimate, how many people in your village drink boiled water?

<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
0% - (almost) nobody	25% - some	50% - the half	75% - quite many	100% - (almost) all

२०३ बाउंदो महिनासम्म तपाइले कति उमालेको पानी पिउने अनुमान गर्नुभएको छ ?

<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	...	जम्मा पिउने पानीको खपत
0%	25%	50%	75%	100%		

202 How much boiled water you intend to drink in the near future (next month)?

<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	...	of my total water consumption.
0%	25%	50%	75%	100%		

२०४ के तपाइको उमालेको पानी पिउने बानी हो ?

बानी होइन	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	बानी हो
	☹	☹☹	☹☹☹	☹☹☹☹	☹☹☹☹☹	

204 Is drinking boiled water a habit for you?

not at all a habit	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	a very strong habit
	☹	☹☹	☹☹☹	☹☹☹☹	☹☹☹☹☹	

२०५ तपाइको बिचारमा उमालेको पानी पिउनु राम्रो हो कि होइन ?

एकदमै नराम्रो	<input type="checkbox"/> -4	<input type="checkbox"/> -3	<input type="checkbox"/> -2	<input type="checkbox"/> -1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	एकदमै राम्रो
	☹☹☹☹	☹☹☹	☹☹	☹	☹	☹	☹☹	☹☹☹	☹☹☹☹	

205 How good or bad do you think is consuming boiled water?

it is very bad	<input type="checkbox"/> -4	<input type="checkbox"/> -3	<input type="checkbox"/> -2	<input type="checkbox"/> -1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	it is very good
	☹☹☹☹	☹☹☹	☹☹	☹	☹	☹	☹☹	☹☹☹	☹☹☹☹	

सोडिस बारे ज्ञान SODIS knowledge

२११ तपाइले सोडिसको बारेमा सुन्नु भएको छ / घाममा बोतल सुकाउने विधिबारे थाहा छ ?

- थाहा छैन → प्रश्न न २१० मा जानुहोस्
 थाहा छ → तलको प्रश्न सोध्नुहोस्

211 Have you ever heard of "SODIS" (Nepali word) / do you know about putting water in the sun?

- no → go to Table "SODIS and other water treatment use history" on next page
 yes → continue below

२१२ कृपया मलाई सोडिसको बारेमा केही कुरा भन्नु सक्नुहुन्छ ? (के हो र कसरी काम गर्छ) ?

→ अन्तरवार्ताकर्ता: बहुउत्तर सम्भावना, जवाफहरू नपढ्नुहोस्, दिएको जवाफमा चिनी लगाउनुहोस्, अरु पनि केहि छ कि भनेर प्रश्न गर्नुहोस्

212 Could you please explain SODIS to me (what it is and how it works)?

- Interviewer: Please check the following checklist for what the interviewed person has mentioned. Please, do not help.

सोडिस कसरी गर्ने भन्ने बारे Knowledge on how to prepare SODIS water

- _a प्लाष्टिकको बोतल Plastic bottles
 _b पानीलाई घाममा राख्ने विधि Sun exposure of the water
 _c बोतललाई राम्ररी पखाल्नु पर्दछ that the bottles have to be cleaned
 _d बोतललाई ढक्किएर घाममा सुकाउनु पर्दछ, that the bottles have to be exposed horizontally
 _e ६ घण्टा सम्म घाममा राख्ने (अथवा १ दिन) 6 hours of sun exposure (or 1 day)
 _f बादल लागेमा २ दिनसम्म राख्ने 2 days sun exposure when it is cloudy

किटाणु मार्ने प्रक्रिया बारे ज्ञान Knowledge on the disinfection process:

- g पानी शुद्धिकरण/पानी प्रशोधन /किटाणुहर मार्लेन् Water disinfection or Water treatment or it kills microbes
- h परावैज्ञानिक किरणले किटाणु मार्ले UV radiation (that UV radiation kills bacteria)
- j तापक्रम (बढी तापले किटाणुहरु मार्लेन्) Temperature (that increased temperature kills bacteria)

२१३ अन्तरवार्ताकर्ता: कृपया उत्तरदाताको ज्ञानको मापन गर्नुहोस्

ज्ञान छैन धेरै ज्ञान छ

213 Interviewer: Please rate the level of knowledge on a scale

no knowledge very profound knowledge

२१४ तपाईंलाई सोडिस प्रविधिद्वारा किटाणुहरु मार्ले भन्ने विश्वास लाग्छ ?

0% = बासो 25% = केही मात्रामा लाग्छ 50% = लाग्छ/लाग्दो 75% = झै लाग्छ 100% = पूर्ण विश्वास छ

214 Do you believe SODIS reliably kills all the microbes in the water?

0% (almost) none 25% some 50% the half 75% quite many 100% (almost) all

जानकारीको स्रोत:

तपाइले सोडिसको बारे कहाँ, कहिले र को बाट सुन्नुभयो ? तपाइलाई दिएको जानकारी कतिको मनपन्थो र के ती जानकारी पर्याप्त थिए ?

Information sources:

Where and when did you hear about SODIS for the first time? From where / whom did you receive information about SODIS since then? How much did you like the information and how convincing was it for you?

मिति (महिना/बष) Date (MM/YY) <u>a</u>	सूचनाको स्रोत Source (please describe as accurate as possible) <u>b</u>	<ul style="list-style-type: none"> तपाईंलाई(स्रोत) मनपन्थो ? Did you like the ... (insert source)? <u>c</u> तपाइलाई सोडिस प्रयोग गर्न..... (स्रोत) पर्याप्त थिए ? Did the ... (insert source) convince you to use SODIS? <u>d</u>
२२१	कसबाट सोडिसबारे पहिलो सुनेको <u>First introduction to SODIS:</u>	<p>चाहना: पढने मन परेन <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> मन परेको 100%</p> <p>Liking: not at all <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> yes, 100%</p> <p>सोडिसको प्रयोग: <input type="checkbox"/> हो <input type="checkbox"/> छ</p> <p>Start SODIS: <input type="checkbox"/> no <input type="checkbox"/> yes</p>
२२२		<p>चाहना: पढने मन परेन <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> मन परेको 100%</p> <p>सोडिसको प्रयोग: <input type="checkbox"/> हो <input type="checkbox"/> छ</p>
२२३		<p>चाहना: पढने मन परेन <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> मन परेको 100%</p> <p>सोडिसको प्रयोग: <input type="checkbox"/> हो <input type="checkbox"/> छ</p>

२२४		चाहना: पढ्कै मन परैत 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> मन परतो 100% सोडिसको प्रयोग: 0 <input type="checkbox"/> छैन 1 <input type="checkbox"/> छ
-----	--	--

२२५ के तपाईं सोडिस बारे अरु केही जानकारी लिन चाहनुहुन्छ ?

पर्याप्त जानकारी छ 0 1 2 3 4 धेरै चाहन्छु

☹️ 😐 😊 😄 😁

215 *Would you like to know more about SODIS?*

no, I know enough 0 1 2 3 4 *yes, very much*

☹️ 😐 😊 😄 😁

प्रचलन सामग्रीहरू

तपाईंले सोडिसको बारेमा जानकारी भएको कुन कुन सामग्री, कहिले (जस्तै पर्चा, क्यालेन्डर, पोस्टर आदि) पाउनु भएको छ ? ती सामग्रीहरू कति मन पर्यो र सोडिस प्रविधि बारे सम्झन कतिजो उपयोगी लाग्यो ?

Promotion materials:

Did you receive any promotion materials about SODIS like flyers, pamphlets, calendars etc.? Which and when? How much did you like the material and did it help you to remember doing SODIS?

मिति (महिना/वष) Date (MM/YY) _a	सामग्री <i>Material (please describe as accurate as possible)</i> _b	<ul style="list-style-type: none"> • तपाईंलाई(सामग्री) मनप्यो ? • <i>Did you like the ... (insert material)?</i> _c • के ती सामग्रीद्वारासोडिसबारे सम्झन उपयोगी रह्यो? • <i>Did the ... (insert material) help you to remember using SODIS?</i> _d चाहना: पढ्कै मन परैत 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> मन परतो 100% Likang: not at all 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> yes, 100% सम्झन पर्याप्त थिएन 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> पर्याप्त थियो, 100% Remembering: not at all 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> yes, 100%
२२१		चाहना: पढ्कै मन परैत 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> मन परतो 100% सम्झन पर्याप्त थिएन 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> पर्याप्त थियो, 100%
२२२		चाहना: पढ्कै मन परैत 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> मन परतो 100% सम्झन पर्याप्त थिएन 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> पर्याप्त थियो, 100%
२२३		चाहना: पढ्कै मन परैत 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> मन परतो 100% सम्झन पर्याप्त थिएन 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> पर्याप्त थियो, 100%
२२४		चाहना: पढ्कै मन परैत 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> मन परतो 100% सम्झन पर्याप्त थिएन 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> पर्याप्त थियो, 100%

सोडिसको इतिहास(बितेका ५ वर्षदेखि आजका दिन सम्म सोडिस र अरु पानी शुद्धीकरण प्रयोगका बारे इतिहासहरू लेख्नुहोस्) के तपाईं खानेपानी शुद्धीकरण गर्न सोडिस तथा अरु कुनै विधि अपनाउनु हुन्छ ? यी विधिहरू अहिले पनि प्रयोग गर्दै हुनुहुन्छ ? खानेपानी शुद्धीकरण गर्ने विधिहरू कहिले देखि प्रयोग गर्नुभएको र कहिले देखि छोड्नु भएको विस्तृत विवरण दिनुहोस् ।

SODIS and other water treatment use history from about 5 years ago until today:

Have you used SODIS or another water treatment? Are you still using it? Please tell us all the dates when you started and stopped using SODIS or water treatment and please name the reasons for starting and stopping.

	सुरु गरेको मिति (महिना/वर्ष) Date start (MM/YY) _a	छोडेको मिति (महिना/वर्ष) Date stop (MM/YY) _b	के कारणले गर्दा सोडिस प्रयोग गर्नुभएको (जस्तै: जनचेतना, प्रमोशन आदि) What was the reason you started (e.g. promotion event etc.)? _c	के कारणले गर्दा सोडिस छोड्नु भएका ? Why did you stop? Please try to remember the exact cause! _d
२४१				
२४२				
२४३				
२४४				
२४५				
२४६				
२४७				
२४८				

सोडिस सम्बन्धी जनधारणा SODIS water attitudes

२५१ तपाइलाई सोडिस पानी मनपर्छ कि पर्दैन ?

मनपर्दैन मनपर्छ

251 Do you like or dislike drinking SODIS water?

dislike it very much like it very much

२५२ तपाइलाई सोडिस पानीको स्वाद ठिक लाग्छ कि लाग्दैन ?

ठिक लाग्दैन ठिक लाग्छ

252 Do you think SODIS water tastes good or bad?

it tastes very bad it tastes very good

२५३ तपाइको बिचारमा सोडिस पानीले स्वास्थ्यमा असर पार्छ कि पर्दैन ?

स्वास्थ्यमा असर पार्छ स्वास्थ्यमा असर पर्दैन

253 Do you think SODIS water is good or bad for your health?

it is very bad for my health it is very good for my health

२५४ तपाइको बिचारमा सोडिस गर्न धेरै समय र मिहिनेत लाग्छ कि लाग्दैन ?

समय र मिहिनेत लाग्छ समय र मिहिनेत लाग्दैन

261 **How do other people think of you if you drink SODIS water?**

they think very bad about me they think very good about me

२६२ तपाइको विचारमा तपाईंको समुदायमा कति घरघुरीले सोडिस गर्छन् ?

0% = कसैले पिउँदैन 25% = केही 50% = आधा 75% = प्राय सबैले पिउँछन् 100% = सबैले पिउँछन्

262 **Please estimate, how many people in your village drink SODIS water?**

0% – (almost) nobody 25% – some 50% – the half 75% – quite many 100% – (almost) all

२६७ तपाइको विचारमा सोडिस प्रयोगकर्ता बढ्दैछ कि घट्दैछ ?

घट्दैछ बढ्दैछ

267 **Has the number of SODIS user increased or decreased since the first introduction of SODIS?**

decreased a lot increased a lot

२६३ आउँदो महिनासम्म तपाइले कति सोडिस पानी पिउने अनुमान गर्नुभएको छ ?

... जम्मा पिउने पानीको खपत
0% 25% 50% 75% 100%

262 **How much SODIS water you intend to drink in the near future (next month)?**

... of my total water consumption.
0% 25% 50% 75% 100%

२६४ के तपाइको सोडिस पानी पिउने बानी हो ?

बानी होइन बानी हो

264 **Is drinking SODIS water a habit for you?**

not at all a habit a very strong habit

२६५ तपाइको विचारमा सोडिस पानी पिउनु राम्रो हो कि होइन ?

एकदमै राम्रो एकदमै राम्रो

265 **How good or bad do you think is consuming SODIS water?**

it is very bad it is very good

२६६ तपाईंको विचारमा सोडिस पानी प्रयोग गर्दा भाडापखला लागेको छ कि छैन ? अनुभव छैन

धेरै लागेको छ no change धेरै लागेको छैन

266 **Do you think you have more or less diarrhea when you use SODIS?** no experience

a lot more no change a lot less

२६८ सोडिसको फाइदाहरु के के हुन् र तपाईंले किन सोडिस प्रयोग गर्नु भएको ? *What are advantages of SODIS (why do / did you use it)?*

२६९ सोडिसको नेफाउन्ड वा समस्याहरु के के हुन् ? तपाईंले किन प्रयोग नगर्नु भएको अथवा किन प्रयोग गर्न छोड्नु भएको हो ? *What are disadvantages or problems of SODIS (why are you not using it / why did you stop)?* ...

सोडिस प्रयोगकर्ता SODIS use

२७१ हाल तपाईं सोडिस प्रयोग गर्नुहुन्छ ?

→ अन्तरवार्ताकर्ता: छानेपानी छपत गरेको अवस्था (पेज ३) र सोडिसको इतिहास (पेज ३) मा गई जाँच गर्नुहोस् ।

¹ गर्दिन ² एक पटक गरेको ³ अनियमित ⁴ नियमित

271 **At the moment, you are using SODIS?**

→ Interviewer: Please check for consistency of the answers with Table "Water consumption" (page 3) and Table "SODIS use history" (page 7)

¹ no ² I tried, but have stopped ³ yes, but irregularly ⁴ yes, regularly

→ यदि यो परिवारले सोडिस प्रयोग गर्दैन भने (गरेको छैन वा छोडिसक्यो) कृपया क्लोरिनेसनमा जानुहोस् अर्को पेजमा जानुहोस् ।

→ In case the family does not use SODIS (no or has stopped), please go to CHLORINATION etc. next page

→ यदि यो परिवारले नियमित अथवा अनियमित सोडिस गर्दैन भने तलको प्रश्न सोध्नुहोस् ।

→ In case the family uses SODIS (irregularly or regularly), please continue below:

२७२ तपाईंले कहिले देखि सोडिस प्रयोग गर्दै आउनु भएको छ?..... महिना/वर्ष

272 **Since when are you using SODIS?**..... month / year (please state month and year)

२७३ तपाईं प्रायः कति पल्ट बोतल गर्नुहुन्छ ?पल्ट हप्ताको/महिना

273 **How often do you prepare the bottles?** times per week / month (please underline week or month)

२७४ के तपाईं सोडिस त्यसै गर्नु हुन्छ अथवा तपाईंलाई सोडिस सम्झनको लागि केही चाहिन्छ ?

त्यसै गर्दैनौं ⁰ ¹ ² ³ ⁴ त्यसै गर्छौं

274 **Is SODIS something you do automatically or do you need something to remind you?**

not at all automatic ⁰ ¹ ² ³ ⁴ very automatic

२७४A तपाईं सोडिस गर्ने बेलामा के सम्झिन हुन्छ । (जस्तै बोतल, अरु मानिसहरू भोजा कुरा ईत्यादी)

274A **What reminds you of doing SODIS?** (for example: the bottles, other people...)

२७५ के सोडिस गनलाई गाह्रो छ ?

धेरै गाह्रो छ

-4	-3	-2	-1	0
☹☹☹☹	☹☹☹	☹☹	☹	☺

 गाह्रो छैन

275 How difficult is it to remember doing SODIS?

it is very difficult

-4	-3	-2	-1	0
☹☹☹☹	☹☹☹	☹☹	☹	☺

 it is not difficult at all

२७६ के सोडिस गर्नु तपाइको दिनचर्या बनिसकेको छ ?

छैन

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 छ

276 Does doing SODIS belong to your daily routine?

not at all

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 very much

२७७ तपाइको विचारमा तपाइले सोडिस धेरै पहिले देखि गर्दै आउनु भएको छ ?

धेरै पहिले देखि होइन

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 धेरै पहिले देखि हो

277 Do you think you have been doing SODIS for a long time?

not at all

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 for a very long time

२७८ के तपाइले सोडिसको बोतल सधैं एउटै स्थानमा राख्नुहुन्छ ?

धेरै स्थानमा राख्छु

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 एउटै स्थानमा राख्छिन

278 Do you prepare the SODIS bottles always at the same place?

always a different place

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 always the same place

२७९ के तपाइले सोडिसको बोतल सधैं एउटै समयमा राख्नुहुन्छ ?

विभिन्न समयमा राख्छु

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 एउटै समयमा राख्छु

279 Do you prepare the SODIS bottles always at the same time?

always a different time

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 always the same time

२८० तपाईं सोडिस गर्नको लागि कतिको सोच्नु हुन्छ ?

सोचदिन

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 सधैं सोच्नु

280 How often do you think about preparing SODIS?

never

0	1	2	3	4
☺	☺	☺☺	☺☺☺	☺☺☺☺

 very often

२८१ के तपाईं सोडिस गर्न भुल्नु हुन्छ ?

सधैं भुल्छु

-4	-3	-2	-1	0
☹☹☹☹	☹☹☹	☹☹	☹	☺

 कहिल्यै भुल्दिन

281 **How often do you forget doing SODIS?**

very often	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	never
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	

२८२ तपाइलाई सोडिस गर्न शुरु क्रियाकलापले बाधा पुऱ्याएको छ ?

धेरै बाधा पुऱ्याएको छ	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	बाधा पुऱ्याएको छैन
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	

282 **Do other habits hinder you in doing SODIS?**

very much	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	not at all
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	

क्लोरीनेसन अथवा फिल्टर पानी सम्बन्धी जनधारणा
CHLORINATED or FILTERED or BOUGHT water attitudes

२९०. अन्तरवार्ताकर्ता : यदि सोडिस गर्नु हुँदैन भने कुन विधि प्रयोग गर्नुहुन्छ ?

1 क्लोरिनेसन 2 फिल्टर 3 किनेको पानी

290c **Which type of water treatment method do you use apart from boiling or SODIS?**

1 chlorine 2 filter 3 buying water

- यदि क्लोरिनेसन गर्नुहुन्छ भने तल उल्लेखित प्रश्नहरू क्लोरिनेसन सम्बन्धी गर्नुहोस् → खाली ठाँउमा १ नम्बर लेख्नु होस्
- In case the person Uses mainly chlorine, ask all questions for chlorinated water. → fill the gaps with "1"
- यदि फिल्टर प्रयोग गर्नुहुन्छ भने तल उल्लेखित प्रश्नहरू फिल्टर सम्बन्धी गर्नुहोस् → खाली ठाँउमा २ नम्बर लेख्नु होस्
- In case the person Uses mainly a filter, ask all questions for filtered water. → fill the gaps with "2"
- यदि किनेको पानी प्रयोग गर्नु हुन्छ भने तल उल्लेखित प्रश्नहरू किनेको पानी सम्बन्धी गर्नु होस् → खाली ठाँउमा ३ नम्बर लेख्नु होस्
- In case the person mainly buys drinking water, ask all questions for bought water: → fill the gaps with "3"

२९१ तपाइलाई (क्लोरीन / फिल्टर / किनेको) पानी मन पर्छ कि पर्दैन ?

मनपर्छ	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	मनपर्दैन
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	⊗	⊗	⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	

291 **Do you like or dislike drinking (chlorinated / Filtered / bought) water?**

dislike it very much	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	like it very much
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	⊗	⊗	⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	

२९२ तपाइलाई (क्लोरीन / फिल्टर / किनेको) पानीको स्वाद ठिक लाग्छ कि लाग्दैन ?

ठिक लाग्दैन	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	ठिक लाग्छ
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	⊗	⊗	⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	

292 **Do you think (chlorinated / filtered / bought) water tastes good or bad?**

it tastes very bad	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	it tastes very good
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	⊗	⊗	⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	

२९३ तपाइको बिचारमा (क्लोरीन / फिल्टर / किनेको) पानीले स्वास्थ्यमा असर पार्छ कि पार्दैन ?

स्वास्थ्यमा असर पार्छ	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	स्वास्थ्यमा मा असर पार्दैन
	⊗⊗⊗⊗⊗	⊗⊗⊗⊗	⊗⊗⊗	⊗⊗	⊗	⊗	⊗	⊗⊗	⊗⊗⊗	⊗⊗⊗⊗	

305 **How good or bad do you think is consuming (chlorinated / filtered / tough) water?**

it is very bad 4 3 2 1 0 1 2 3 4 *it is very good*

☹☹☹☹ ☹☹☹ ☹☹ ☹ ☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

संचार Communication

तपाइले तल उल्लेखित विषयमा आफ्नो छरछिमेक, साथी र परिवारसँग कतिको कुरा गर्नुहुन्छ ?

With your family, friends and neighbors, how often do you talk about ...

	कहिल्यै पनि गर्दिन <i>never</i>				बहुन प्राय सधै गर्छु <i>very often</i>
३११ ... स्वास्थ्य र रोगको बारेमा ... <i>health issues or diseases?</i>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
३१२ ... पानीको विषयमा ... <i>water issues?</i>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
३१३ ... सोडिसको विषयमा ... <i>SODIS?</i>	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>

३१४ तपाईंलाई सोडिसको बारेमा कुरा गर्न मन पर्छ कि पर्दैन ?

पर्छ 4 3 2 1 0 1 2 3 4 पर्दैन

☹☹☹☹ ☹☹☹ ☹☹ ☹ ☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

314 **Do you like or dislike talking about SODIS?**

dislike it very much 4 3 2 1 0 1 2 3 4 *like it very much*

☹☹☹☹ ☹☹☹ ☹☹ ☹ ☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

३१५ बित्तिको महिनामा तपाइले कति मानिसहरूले सोडिसको बारेमा कुरा गरेको सुन्नु भयो ?

कहिल्यै पनि सुनेन 0 1 2 3 4 प्रायजसो सुनियो

☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

315 **How often did you hear people talking about SODIS last month?**

never 0 1 2 3 4 *very often*

☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

३१६ आउँदो महिनामा तपाईंले कति पटक सोडिसको बारेमा कुरा गर्ने अनुमान गर्नु भएको छ ?

कहिल्यै पनि गर्दिन 0 1 2 3 4 प्रायजसो गर्छु

☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

316 **How often do you intend to talk in the near future about SODIS (next month)?**

never 0 1 2 3 4 *very often*

☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

३१७ साधारणतया: तपाईं सोडिसको बारेमा कुरा गर्न चाहनुहुन्छ ?

कहिल्यै पनि चाहन्न 0 1 2 3 4 प्रायजसो चाहन्छु

☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

317 **How often do you normally think about talking about SODIS?**

never 0 1 2 3 4 *very often*

☹ ☹ ☹☹ ☹☹☹ ☹☹☹☹

प्रतिक्रिया/सुभावहरू *Comments & recommendations*

३१९ तपाइसँग हामीलाई दिने केही प्रतिक्रिया/सुभावहरू छन् *Do you have any comments for us?*

.....

.....

सोडिस घरधुरी अवलोकन - यदि घरधुरीले सोडिस प्रयोग गर्छन् भने) *SODIS use observations (in case the household uses SODIS)*

- ३२१ घर भित्र कतिवटा बोतलहरू थियो ?.....^१ थाहा भएन
- ३२१ *How many bottles were in the household?*.....^१ not observable
- ३२२ कतिवटा बोतल घाममा सुकाएको थियो ?^१ थाहा भएन
- ३२२ *How many bottles are exposed to the sun?*^१ not observable
- ३२३ के सोडिस बोतल सही तरिकाले सुकाएको थियो ?
- ^० धिएन ^१ अलि अलि ^२ सबै थियो ^३ थाहा भएन
- ३२३ *Are they exposed correctly?* ^० none ^१ some ^२ all ^३ not observable

अन्तर्वार्ता सकिएको समय: *End time*

Official Use:

Control: yes

Who?

Data entered: yes

Who?

10.2 Promoters questionnaire

General information regarding the interview

- P150 **Date of the interview:**
- P151 **Name of the interviewer:**
- P152 **Village / District:**
- P153 **Type of community** (rural, urban, agriculture etc.):
- P154 **Years of promotion** (phase):
- P155 **Organization:**

Data of the promoter

- P156 **Name:**
- P137 **Age:**
- P157 **Language:**
- P138 **Gender:** ¹ female ² male
- P139 **Is the promoter a local person?** ⁰ no ¹ yes

Project details

- P103 **What was the duration of the project (months)?**
- P101 **What was your workload during this time (percent)?**
- P102 **How many promoters were involved in your community? (number)**
- P104 **How many households did all promoters train together in your community? (number)**
- P105 **How many households live in your community? (number)**

Training of the promoters

- P158 **Did you receive a training to be a promoter?** ⁰ no ¹ yes

--> in case of "NO", continue next section

- P106 **How long was that training? (days)**

- P107 **Do you think the training was interesting?**

not interesting at	⁰ <input type="checkbox"/>	¹ <input type="checkbox"/>	² <input type="checkbox"/>	³ <input type="checkbox"/>	⁴ <input type="checkbox"/>	very interesting
all						

- P108 **Did you learn enough about SODIS in the training?**

not enough at all	⁰ <input type="checkbox"/>	¹ <input type="checkbox"/>	² <input type="checkbox"/>	³ <input type="checkbox"/>	⁴ <input type="checkbox"/>	clearly enough

P109 **Did you enjoy participating in the training?**

not at all enjoyed it very
 ☹️ ☺️ ☺️☺️ ☺️☺️☺️ ☺️☺️☺️☺️ much

Training / promotion activities to the households

P159 **Which type of training did you give to the households?**

¹ group training ² individual training (household visits)

P110 **Who was the target group of the training?** ¹ everybody in the community

² a selected group – who? P110_det

P111 **How long lasted one training?** (hours)

P112 **How many households participated on average in one training?** (number)

P113 **How many trainings were held in your community?** (number)

P114o **About what did you talk during the training?**

P114 *Interviewer: Was the topic of water treatment / health combined with another topic?*

⁰ no ¹ yes

Materials given to the households

P115 **Were there any materials given out to the people during the project?**

⁰ no ¹ yes P115_det **Which?**

Monitoring activities after initial training of the households

P160 **Which type of monitoring did you give to the households?**

¹ group meetings ² individual monitoring (household visits)

P116 **How many households were you responsible for?** (number)

P117 **How often did the monitoring take place?** (frequency per week)

P118 **Is the monitoring still ongoing** (in the sense that during other activities sometimes promoters also talk about household water treatment / SODIS)? ⁰ no ¹ yes

Payment of the promoter

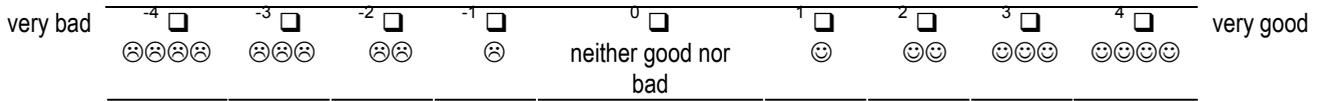
P119 **Did you receive a payment for your work?** ⁰ no ¹ yes

P120 **Did you feel the incentives (includes money) you received were adequate?**

not at all very much
 ☹️ ☺️ ☺️☺️ ☺️☺️☺️ ☺️☺️☺️☺️ adequate

General project evaluation

P121 Was the promotion strategy good or bad?



P122 Was it easy to convince people of SODIS?



P122_det What made it easy / difficult to convince people?

P123 Was the project work liked or disliked by the people?



P124 Did people understand the SODIS method?



P125 How many households were using SODIS during / after the project? (% of trained)

P126 How many households still use SODIS at the moment? (% of trained)

P127 Did you like or dislike the project work?



P128 Did you feel well supported by your local NGO?



P129 Overall, do you think the project was successful?



Bottle supply

P130 Did a bottle supply scheme exist during the project? 0 no 1 yes

P131 How many bottles were given to the households? (number)

P132 Was it a problem for people to have enough bottles to do SODIS?



SODIS & promoter

P140 **Did you use SODIS yourself during project time?** ⁰ no ¹ yes

Could you please explain SODIS to me (what it is and how it works)?

P141a *Interviewer: Please rate the level of knowledge on HOW TO DO SODIS on a scale*

no knowledge ⁰ ¹ ² ³ ⁴ very profound knowledge
 ☹️ ☺️ ☺️☺️ ☺️☺️☺️ ☺️☺️☺️☺️

P141b *Interviewer: Please rate the level of knowledge on WHY SODIS WORKS on a scale*

no knowledge ⁰ ¹ ² ³ ⁴ very profound knowledge
 ☹️ ☺️ ☺️☺️ ☺️☺️☺️ ☺️☺️☺️☺️

P142 **Do you believe SODIS reliably kills all the microbes in the water?**

⁰ ¹ ² ³ ⁴
 0% = (casi) ningunos 25% = algunas 50% = la mitad 75% = muchos 100% = (casi) todos

P144 **How important is water treatment compared to other health topics?**

a lot less important ⁻⁴ ⁻³ ⁻² ⁻¹ ⁰ average importance ¹ ² ³ ⁴ a lot more important
 ☹️☹️☹️☹️ ☹️☹️☹️ ☹️☹️ ☹️ average importance ☺️ ☺️☺️ ☺️☺️☺️ ☺️☺️☺️☺️

P161 **What do you think are the reasons that people do NOT use SODIS? What are problems with SODIS?**

.....

.....

.....

P162 **Do you have any other comments for us?**

.....

.....

Official Use:			
Control: <input type="checkbox"/> yes	Who?Data entered: <input type="checkbox"/> yes	Who?

10.3 Organizations questionnaire

Organization:

Name of Interviewee:

Date & Time:

Phase:

Time frame:

Communities:

Introduction

Organization

- exist since when:
- how many people:
- structure
- activities:
- long term strategy related to POUs / commitment
- network with other organizations

Description of the project

- which water treatment options:
- which activities
- which promotion materials
- how many targeted households:
- how many SODIS user roughly:
- special events during the project phase

Detailed description of all activities

- evaluation of each strategy:
 - aim of the strategy:
 - Was the strategy in general successful?
 - Did people learn sufficient about SODIS?
 - Did people understand about SODIS?
 - Did it convince the people to use SODIS?
 - Did people like it?
 - Did it initiate uptake?
 - problems, special experiences
- particularly promoters:
 - self or other organization:
 - same community vs. outside:
 - payment:

- training mode:
- number of promoters:
- families per promoter:
- frequency of household visits:
- Were they competent to promote SODIS?
- Were they motivated to promote SODIS?
- Did they use SODIS themselves?
- problems, special experiences:

Households

- socio-economic status:
- water source:
- water consumption before and after the project
 - before
 - now
- how was the campaign perceived
- motivation of the people to use SODIS:
- how was uptake (fast, slow)
- problems at household level:
- bottle supply scheme:

General

- Was the time frame for the project sufficient?
- Was the budget for the SODIS project sufficient?
- Was the project altogether successful?
- lessons learnt for the organization