

# SODIS - WATER QUALITY IMPROVEMENT AT HOUSEHOLD LEVEL

## A CASE EXAMPLE FROM KENYA

### SUMMARY

The Water Supply and Sanitation Project being implemented by the Christian Community Services (CCS) tested and introduced SODIS to rural communities in the North Rift Area of Kenya from 2001 to 2004. When introducing SODIS to the women groups, their first question was "Does it work?" Bacteriological tests were undertaken on the raw water from rain water tanks, natural springs and shallow wells and compared to the same water treated by SODIS; SODIS was effective in killing diarrhoea causing pathogens. People using SODIS to treat their drinking water significantly could improve their health. Their incidence of diarrhoea was reduced by more than 60%. From the perspective of rural women comparing different techniques of water disinfection, SODIS was found to be to most useful and efficient. It has proved to be a simple, cheap, renewable and environmentally friendly technique to reduce the risk of waterborne diseases.



### THE CONTEXT

The Water Supply and Sanitation Project being implemented by the Christian Community Services (CCS) works with rural self help groups to improve their access to clean, safe, domestic water. Operating in the North Rift area of Kenya, the groups are building household rainwater catchment systems, protecting shallow hand dug wells and using rope and washer pumps. This provides for water supply, but one important issue is how to ensure that the water is safe. As the project objective is to improve the health and economic status of the community, environmental hygiene and sanitation training has been undertaken in order to reduce the risk of waterborne disease transmission, (Faecal - oral cycle) and promote improved hygiene behaviour.

Rainwater, collected in the roof catchment tanks, is a good source of safe water, provided precautions are taken to maintain cleanliness of the system. Common sources of water in the area are the rivers, unprotected shallow wells and springs which are contaminated by pathogens that cause disease. A high incidence of diarrhoea, and even typhoid is reported, documenting that contamination problems exists.

The community members commonly treated their water by settlement or storage. Disinfection by boiling is practiced, but due to time pressure and the effort involved in collecting firewood and boiling water the practice is often neglected.

An alternative method of water disinfection, SODIS, Solar Disinfection of water has been promoted with some of the groups to provide safe, household drinking water. This case

example reports the experiences from these groups and in particular from 3 communities in which a health impact survey was undertaken.



*Fig. 1: Common water sources in the area are rivers, unprotected shallow wells and springs.*

## THE PROJECT

The SODIS idea was first used in the Water and Sanitation Programme in 2000, as one way for households to obtain safe drinking water. Initially there was much enthusiasm as people found SODIS easy to use and cheap compared to alternative methods like boiling. There were also some questions: does it really work?, will it kill the germs?, will it improve our health?

In order to answer these questions EAWAG and the Solaqua Foundation funded an 18 month project to test the SODIS efficiency in Kenya and assess the technical, social and cultural acceptance as well as the impact of SODIS use on community health. From October 2002 to September 2003, 180 households in 5 self help groups in three distinct climatic zones in the rural areas of Kenya were monitored for waterborne disease incidence. 90 household used SODIS, 90 households did not use SODIS. The project sites were Kacheliba, Kaplelach and Matharu where CCS already had an active Water and Sanitation Project.

The entry point to the communities for the SODIS project was through existing self help groups or Women Group. These 5 groups had been participating in CCS development activities for several years and so were receptive to a new technology which could lead to an improved life; The " trust" relationship already existing between the groups and CCS was important for introducing a new idea like SODIS.

Using the power of sunlight is not a new concept to rural Kenyan women; commonly outside the house is a raised wooden platform on which pots, plates and utensils are



*Fig. 2: Water sources are highly contaminated with pathogens leading to high diarrhoea incidence.*



*Fig. 3: SODIS user in Kacheliba*

placed to dry after washing. The women say that the sunlight helps to kill any germs. Building on this, the concepts and practice of SODIS for disinfecting household drinking water were taught. Community health workers (CHW) were trained to monitor monthly administer the of waterborne diseases by household interview. The CHW trained the group members on SODIS use and monitored proper practice and use of SODIS by household members. Monitoring of water quality of SODIS water and raw water was also undertaken. SODIS was also promoted in 6 primary schools as part of the Child to Child, ( Hygiene promotion ), activities which were ongoing in the 6 schools.

The SODIS project in Eldoret has been initiated in 2001 and still is going on. The project is confinanced by the Solaqua Foundation and ACK Eldoret, CCS. Following the completion of this first phase, the Solaqua Foundation continues to support a second phase targeting periurban communities in two towns, Eldoret and Kitale. The aim is to train 10,000 users of SODIS and promote SODIS in 9 primary schools by April 2005.

In this new venture the CCS SODIS project is collaborating with the Government of Kenya Public Health Departments as they have an existing Primary Health Care structure in the peri urban areas. SODIS becomes one intervention to improve community Health, through safe drinking water.

## ACHIEVEMENTS AND FACTORS OF SUCCESS

### Water quality improvements

The main concern of the community was: "Does SODIS really work? Does it kill the germs?" In order to answer this question a series of bacteriological tests for faecal coliforms were carried out using a DelAgua membrane filter/incubation kit in August 2000 to April 2002. The tests showed that contaminated raw water from different sources was treated successfully. When shown the results of these tests on their own water, the community members were convinced of the SODIS efficiency.

Thus, by using SODIS, the group members were able to successfully disinfect their water. Where contamination was still evident, the users were retrained until SODIS was done successfully. A survey showed that in September 2003, 98% of SODIS users were practicing the method correctly.

### Health Benefits

During the same survey, 180 households participated in a health impact study. 90 households used SODIS, 90 did not use SODIS. Other conditions for both user and non user groups were the same; such as for example, participating in hygiene training or improving water sources. Compared to SODIS users, non users had a three times higher incidence of waterborne diseases such as diarrhoea, typhoid, dysentery and cholera.

### Acceptability of SODIS

The acceptability of SODIS to group members was assessed by two methods: Individual or group interviews and group matrix ranking comparing alternative methods of getting safe drinking water. The ranking promoted much lively discussion and showed the depth of knowledge that the community has on these issues. SODIS and boiling both met the determining criteria of "efficient in killing pathogens in water" but SODIS ranked number one compared to the last rank for boiling. Community members feel that boiling is expensive both in terms of time and money to buy/

### Preference ranking comparing SODIS with other methods to obtain safe drinking water

Criteria: Kills germs, Taste, Ease of use, Cost, Adequacy of water supply, Minerals

Method	Rank
SODIS	1
3 Pot system	2
Protected shallow well	3
Filtration with cloth	3
Rainwater	5
Alum (or Chlorine)	6
Boiling	7



Fig. 4: Women group training in Kaplelach

collect firewood. The boiled water tastes "bad", compared to SODIS water which is "sweet".

Positive comments given by women group members:

- I use SODIS now every day and it provides for all the household drinking water needs.
- SODIS is easy to use. I just put the bottles out in the morning and "forget" about them. In the evening when I have finished my other work I just bring them in.
- Before, I sometimes used to boil water which was time consuming and the smoke from the fire gave the water a bad taste. SODIS water tastes good.
- I do not need to go and collect so much firewood now. SODIS saves time that I then use to care for my family's needs.
- SODIS is cheap and we can get the bottles ourselves.
- SODIS does make water safe, we no longer get headaches, (associated with typhoid), and diarrhoea.

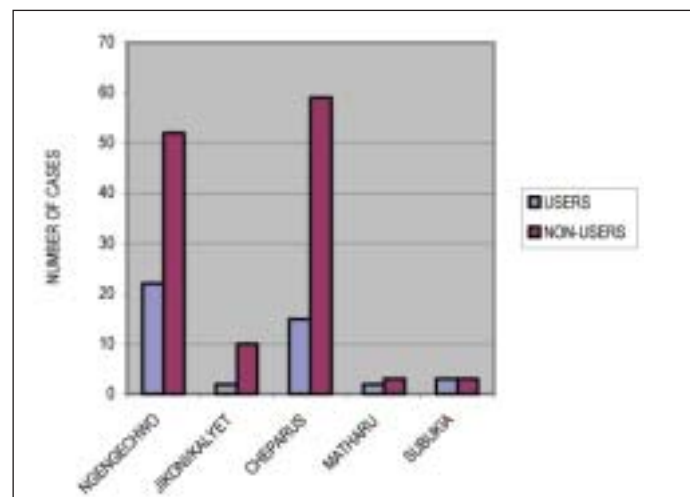


Fig. 5: Incidence of waterborne diseases in different working groups

## THE CHALLENGES

The project has been promoting SODIS practice for 3 years and has successfully trained field staff, public health collaborators, community volunteers and leaders plus many community members and school children. The questions regarding the SODIS method have been answered and adequate IEC material has been produced. Yet the number of users has in the 5 groups remained static or dropped. There seems to be a gap between Knowledge and Practice. Community members say their constraints are:

1. Bottle supply. To access sufficient bottles in remote rural areas is difficult. But in this project, sufficient 2nd hand bottles are being collected from the towns for distribution through the CHW. Therefore, bottle supply is not a constraint in this case.

2. Cost of bottles. 2nd hand two litre bottles cost Ksh 15 to 20, one litre size Ksh 5 to 10 from the local markets or the project stores. Many community members, especially in the new peri-urban areas, feel that this cost is too high. Most of the target group rarely purchase the primary product of squash or fizzy drink. Thus, people do not get 2nd hand bottles that way. The cost of 4 empty bottles for SODIS is about Ksh 80 maximum. This can be compared with a daily wage of Ksh 60 to 100. The cost of treating typhoid, however is Ksh 1000 to 3000. This shows, that there still is a lack of awareness on the relation between drinking clean water and health - or the corresponding change of behaviour has not taken place yet. Social, economic and cultural factors preventing people from taking up new behaviours need to be identified, understood and addressed for wider promotion to take place.

3. In the current peri-urban promotion project, SODIS is being implemented as part of the Primary Health Care Programme of one district. This collaboration will address hygienic behaviour and health, and thus increase the awareness of the community on the importance of treating their drinking water. Sustainability will be ensured through longterm interaction with the community, which is a

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*Fig. 6: SODIS reduced the incidence of waterborne diseases by more than 60%*

precondition to realize the required changes of behaviour. The acceptance of SODIS as a recognised method will be further enhanced due to being part of a government programme.

### Lessons learnt

- The technique of SODIS using bottles effectively inactivates faecal coliforms from a variety of water sources.
- There is a positive effect in reducing waterborne diseases when SODIS is used.
- The technique is acceptable to the rural community, who find it easy to use, low cost, firewood energy saving and time saving.
- Ensuring an adequate supply of suitable bottles is crucial to widespread adoption of SODIS.
- SODIS should be further promoted involving Primary Health Care Programmes, thereby reducing the risk of waterborne diseases.