SOLAR BOTTLES FOR OUR HEALTH

Report of the SODIS Dissemination Project

Phase II: April 2003 – March 2004



By Beat Grimm

Implemented by
JDA International, Inc.
Kokand Branch Office

JDA International, Inc.

Development and Humanitarian Aid for Equipping the Nations

About Us

Joint Development Associates International, Inc. is a private, voluntary, non-profit company, incorporated in Colorado/ U.S.A. in 1994. One of the first NGO's registered in the Republic of Uzbekistan after independence, it has been actively engaged in transformational community development and humanitarian aid throughout the Republic.

JDA and its partner agencies are replacing despair with hope as they attempt to meet the physical, spiritual, societal and economic needs of the people. As they reach out in love to those who have for so long been in Darkness, dignity, self-initiative and a sense of community are slowly returning. As hearts are softened, lives are being changed.

Our Vision

JDA provides holistic community development, education, health services, and humanitarian aid that result in equipping the nations for transformation.

Our Mission

JDA will assist in the transformational development of Central Asia through constructive interaction with individuals, groups, governments, and other organizations to promote and facilitate education and economic development, social well-being, physical and spiritual health, a just society, and restoration of ecological systems.

JDA Projects

Economy Sector:

Micro-Credit Programs

Poultry Raising

Compressed Brick Manufacturing

Computer Training

Water Sector:

Water Development

Water Purification (e.g. SODIS)

Rehabilitation of Desalination Plants

Health Sector:

Community Health: Clinics and Education

Leprosy Control

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Kokand, December 2003

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Ministry of Health

SEN

Ferghana Oblast Health Department

Ferghana branch of the SEN

QVPs and FAPs

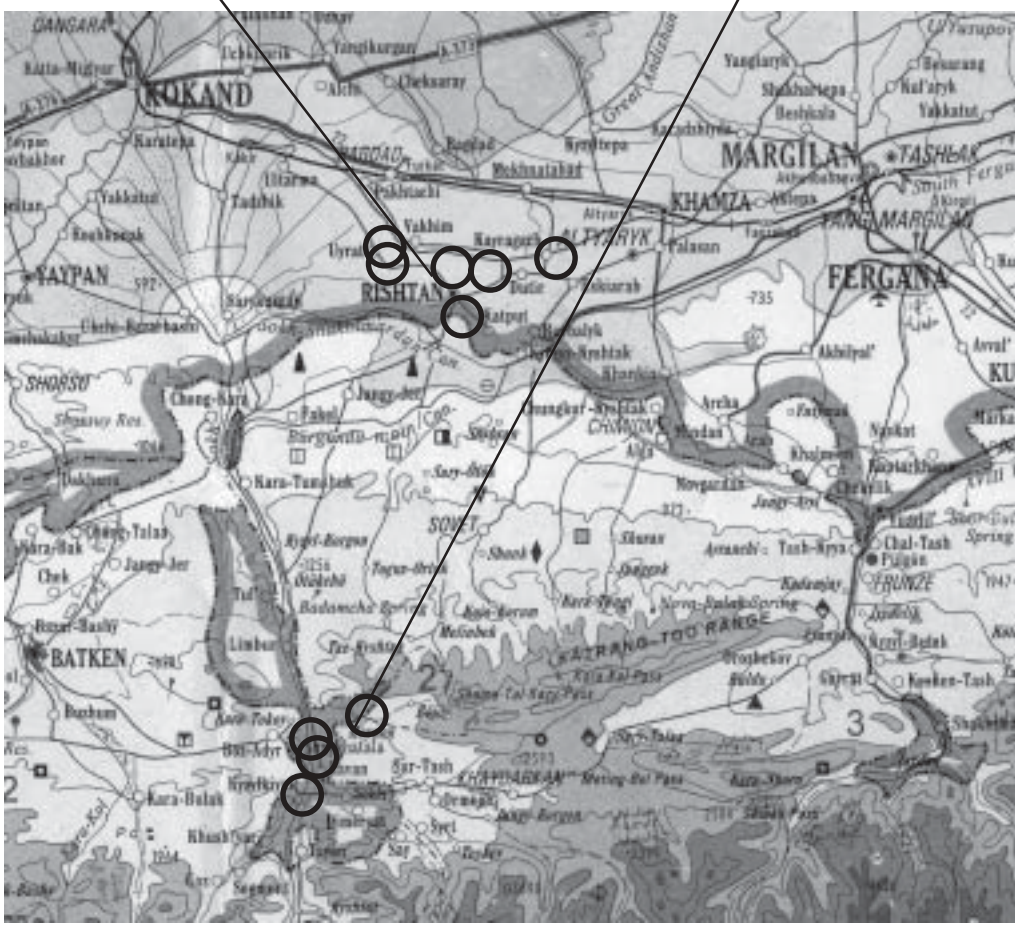
Rishton Education Department

Nongovernmental Organizations (NGOs)

EAWAG/ SANDEC

And finally, without the generous financial support of the SOLAQUA Foundation and EKU AG, these activities would not have been possible.

Project villages Rishton District **Project villages So'x District**



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Executive Summary

"Solar Water Disinfection" (SODIS) is a relatively new water treatment technique. It has been researched and developed by an interdisciplinary team at the Swiss Federal Institute of Environmental Science and Technology (EAWAG) since 1991.

In 2001, the Kokand branch of JDA International, Inc. partnered with EAWAG to conduct a SODIS pilot project in the Dangara district of the Ferghana Viloyat. This project revealed that SODIS was reliable and acceptable to the rural population of Uzbekistan, specifically of the Ferghana Valley.

For two years now, the SODIS Dissemination project has introduced and taught SODIS in ten villages of the Rishton and So'x districts. It focused on reaching large segments of the rural population with the SODIS message, equipping local volunteers and eventually seeing a decline in the incidents of water-borne diseases in the project villages.

The project addressed many needs in the communities and received a positive response. A health impact survey was done in October 2003 after the season came to an end. SODIS communities reported that more than half of the population was using SODIS during the summer, and thirty-eight percent of all households were using SODIS every day.
People were using SODIS in conjunction with other treatment techniques like boiling and sedimentation. Between twenty to fifty percent of daily water consumption was treated using SODIS.

SODIS is an extremly useful method for villages without adequate water supply systems, gas or electricity. The users further reported health benefits for themselves as well as for their families, and more than 89% of users wanted to continue after the winter break.
The project villages had significantly fewer diseases caused by water-borne pathogenes than a randomly selected control group of villages without SODIS in their immediate vicinity. The project villages have had a reduction by two-thirds within two years, compared to little change in the Rishton district and increased numbers of cases in the So'x district.
Given the internationally recognized standard category of diarrhoeal illnesses[1] in children of age 0-5, SODIS communities reported a decrease to only 46.5% (since 2001), while the control group of Non-SODIS villages reported an increase by an average of 28.4%.

JDA has worked together with the SEN Departments of the districts to inform and train them about SODIS. Their extension workers in the villages have been crucial in disseminating SODIS in all the project communities. JDA anticipates even closer cooperation with the Ministry of Health and the SEN Departments on all levels, as SODIS could appears to be a key intervention to address many of the challenges in rural communities.

[1] For the purpose of this statistic, it is not specified which pathogens cause the disease. It could be noninvasive diarrhea (e.g. Infantile Diarrhea) or invasive diarrhea resembling shigella, cholera or salmonellosis. Bartlett, 1995: 60.

1. Introduction

The health sector in Central Asia has been hit hard by the Soviet Union's collapse. Health statistics reveal declines in life expectancy, increases in chronic respiratory infections, and poor maternal and child health.[1]

People in many parts of Central Asia have no access to clean drinking water, as the infrastructure deteriorates, and sewage and industrial waste are allowed to leak into the water supply.
Many water supply networks are in a poor condition, and some need to be completely replaced. This is due to a severe shortage of funds in the twelve years since independence, causing a reduction of experienced staff, a reduction in water quality monitoring, and a reduction in the routine maintenance of equipment.

Within the health sector, there is generally more importance placed on treatment than prevention. This leads to many unnecessary health problems, an over-use of the existing health system, inadequate treatment practices, and limits the empowerment and sense of responsibility of the people. They lack ownership over their lives, especially when it comes to basic needs, such as good health and access to clean drinking water.
There is an increasing need for locally available, low-cost, safe and simple water treatment methods. SODIS could provide a solution to this, as this report will show. Our intention in writing this report and making it public is:



- making our experience and knowledge available to a wider audience;
- providing a framework for the Ministry of Health of Uzbekistan to help with policy formulation in terms of appropriate water treatment methods and hygiene education;
- encouraging national and international organizations working in the water and health sector in Central Asia to consider SODIS.

JDA is therefore publishing this report in English, Russian and Uzbek. It builds on our earlier publications "Bottles in the Sun" and the "SODIS Application Guide", which are also available through JDA.

SODIS creates and supports local initiative in the prevention of water-borne illnesses. The SODIS project seeks to improve people's health in low- and middle-income communities by introducing appropriate technology, supporting sustainable development practises, and empowering the rural population. In partnership with local stakeholders, SODIS promotes an integrated approach to health and capacity building.

1.1. World-wide awareness for drinking water problems

Annually, nearly twelve million children in developing countries die before their fifth birthday. Many of these children die during their first year of life and approximately seventy percent of these deaths are attributed to preventable conditions such as acute respiratory infections (mainly pneumonia), diarrhea, measles, malaria or malnutrition.[2] According to the World Health Organization (WHO), nineteen percent of these infectious diseases come from unsafe water use (they are water-related).

In order to improve the global situation, many international organizations have increased their research and activities to provide clean drinking water for the poor.

At the Millennium Summit in 2000 and at the World Summit on Sustainable Development in Johannesburg in 2002, world leaders recognized the importance of fresh water and committed themselves to a clear and time-bound agenda for protecting the world's current and future water resources, promoting sanitation, and addressing environment issues.
The International Year of Freshwater 2003, declared by UN General Assembly, has further raised the awareness for freshwater problems and the urgent need for their resolution. Using this momentum, this year should mark a transition from commitments and promises to action and implementation.

The International Forum on Fresh Water in Dushanbe, Tajikistan, held from the 29.8. -1.9.2003 emphasized the need for joint action to provide clean drinking water

and improve hygiene and sanitation conditions. Seventy percent of known diseases are caused by poor water quality. Presently, around 2 billion people do not have access to safe drinking water and sanitation. Joint action is therefore needed. The vital nature of water makes it a basis for cooperation between people, institutions and nations.[3]

1.2. The challenging water situation in Uzbekistan and Central Asia

Water is life. As is typical for semi-arid regions without access to the sea, water is a critical element in the lives of Central Asia's population. The available water volume is used for agriculture (mainly irrigation), industrial production and for human and animal consumption. In past decades, Central Asia has experienced the ecological tragedy of the dying Aral Sea, rivers that run dry, and an increased level of ground water contamination. These ecological problems highlight the need for upgrading water management procedures as well as finding new ways to improve water quality.



Vodakanal, the organization responsible for managing the water supply systems in many towns and villages, suffers from a lack of funds as many customers (both individuals and enterprises) fail to pay their monthly fees. This means that it cannot afford to maintain and fund the supply system, or to pay its staff on time. As a result, many water systems providing either ground water (the source of the majority of Uzbekistan's drinking water) or surface water do not treat the water adequately or sometimes do not even treat it at all. In fact, none of the SODIS project villages in the Ferghana Region have any water treatment facilities. For surface water supply systems without treatment there is a very high risk of viral and bacterial infections.

Homes that are not connected to a central water supply system are also at risk. They use either unprotected ponds, fetch water directly from rivers and canals or use standpipes or shallow wells. Often, theses wells are not concrete-lined and are located less than ten meters from an outdoor, unsealed pit latrine. This is a common source of contamination.

Boiling water has been extensively taught, but the people often still drink untreated water straight from the tap, thus endangering their health. Many villages do not have natural gas supply and would therefore be interested in using alternative methods.

Improving water and sanitation facilities only does not necessarily lead to a decrease in water and sanitation related diseases.[4] To bring about real improvements in health, the installation of facilities or improved treatment methods have to go hand in hand with their proper use and maintenance. Hygiene promotion aims to ensure this by motivating people to change their behavior.

Hygiene promotion goes beyond hygiene education. It recognizes that it is not only the potential users of facilities who need to change their behavior; behavioral changes are also needed at other levels. Politicians need to recognize the importance of improving hygiene and water treatment methods, thus creating a favorable political environment. Implementing agencies need to recognize the need to allocate adequate resources to put policy into practice. Field workers need to be willing and able to understand people's hygiene behavior and to build on existing motives to encourage people to accept new ways.

SODIS has been proved to be an ideal solution for the rural population not only in Uzbekistan, but also throughout Central Asia.



1. Prepare the bottle



2. Paint it half-side black



3. Fill 2/3 with contaminated water



4. Shake well to add oxygen

1.3. What is SODIS?

"Solar Water Disinfection" (SODIS) provides an unusually simple, efficient and sustainable drinking water treatment option. It reduces health risks associated with the consumption of contaminated drinking water. SODIS affects pathogens present in the drinking water and therefore reduces the occurrence of enteric diseases caused by these pathogens: infectious diarrhea, dysentery caused by Amoebiasis or Giardiasis, and cholera and others.[5]

SODIS does not require complicated or expensive infrastructure. It enables every household to provide its members with clean, pathogen-free drinking water, by using locally available, low-cost material, and the power of the sun. No maintenance is needed.

How does SODIS assist the rural population in sustainable development practices?

Since SODIS is so simple and only requires locally available material at very low costs, this new method is an ideal solution for many developing or transition countries. Families get access to a tool to "help themselves", one of the essential elements of sustainable development. People are therefore empowered to provide themselves with clean water.
In addition to this, SODIS requires little financial input and only minimal behavioral changes. However, SODIS on its own should not be the sole basis for addressing health issues, but rather it should always be combined with hygiene and sanitation education.

SODIS and gender issues
SODIS decreases women's work loads as the work involved with the SODIS technology is significantly less than with alternative techniques such as boiling. Low-cost technological interventions can often increase women's (and children's) workloads if the gender implications of a technology are not taken into account. SODIS, however, significantly *decreases* women's workloads. This is good news for rural women whose workloads are increasing as a result of changes, such as de-mechanization and family leasehold production for the *shirkat*, in the collective farming system.[6]

How does SODIS work and what is required?

The treatment process is a simple technology using solar radiation to inactivate and destroy pathogenic microorganisms present in the water. The treatment consists in filling half-blackened transparent PET bottles with raw water and exposing them to full sunlight.
The UV-A radiation together with a raised water temperature (about 50° C) kills the micro-organisms and makes the bottled water consumable. It is therefore not necessary to use precious firewood or natural gas to boil water. SODIS does not rely on electrical energy and is therefore suitable for all places in Uzbekistan. With many power cuts especially during the winter months, a treatment method using electrical energy has disadvantages. SODIS utilizes locally available material that is either free or available at low cost such as empty PET-bottles, corrugated sheet metal and some paint.

(Footnotes)
[1] Cashin, 2001: 7.
[2] The World Health Report 2000. 2000: 54.
[3] http://www.freshwaterforum.org
[4] Boot, Cairncross, 1993: 34.
[5] Meierhofer, Wegelin, 2002: 29.
[6] Kandiyoti, 2002: 47.



5. Fill to the rim



6. Place it in the sun



7. Remove after 6 hours, let it cool down



8. Enjoy SODIS water!

2. SODIS Implementation in Uzbekistan

2.1. Pilot Project in the Dangara District, 2001

The SODIS project in Central Asia was initiated in April 2001 by JDA's regional office in Kokand, Uzbekistan. Kokand is situated in the Ferghana Valley. Since the valley receives its surface water from neighboring Kyrgyzstan's mountains, the water quality is relatively good. Further downstream, the water becomes increasingly polluted by human and animal feces as well as by chemicals from industrial enterprises. Another main source of contamination are the herbicides/ pesticides and fertilizers used in agriculture.
The pilot project was aimed at providing some indications of whether the local rural population would accept SODIS and whether the geographical and climatical conditions would guarantee a reliable treatment of drinking water.

Results
JDA has learnt a lot about implementing SODIS. This new method was well accepted, and even poor and less educated people in rural areas were able to use it consistently. It is suitable for the circumstances found in Central Asia. Many people wanted to continue to treat their drinking water with SODIS, but they needed to be reminded after the winter break.

For a description of our activities and a list of "lessons learnt", see the pilot project report "Bottles in the Sun", published by JDA in December 2001.
You can also access the project report on the Internet: http://www.sodis.ch/Text2002/Projects/SODIS_Uzbekistan.

2.2. Dissemination Project, Phase I 2002-2003

The follow-up project aimed to provide JDA staff and promoters with more insights about the day-to-day application of SODIS in the field, common mistakes made by users, and how to improve the dissemination process in the villages. JDA has worked with four promoters from last year's pilot project. They were re-trained for SODIS dissemination, and their role in the training of local SODIS volunteers.

We have concentrated our activities mainly in the following areas:

1. Dissemination of SODIS within the Ferghana Valley to increase our own expertise and knowledge about the implementation of a SODIS project in a Central Asian context.
2. Training volunteers and partner organizations.
3. Establishing a network of NGOs and Health Organizations.

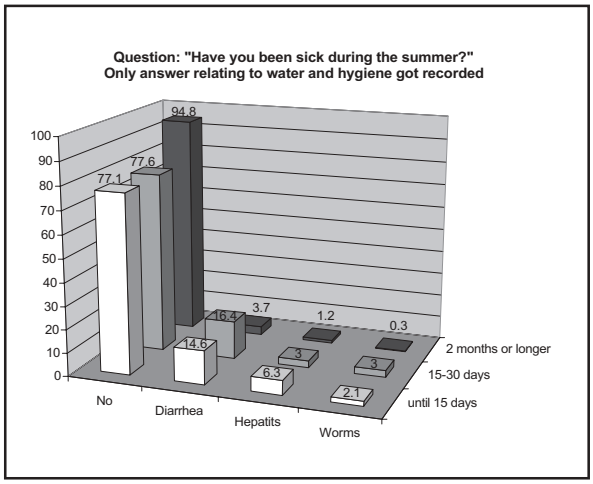
Results
Results from the first year of the SODIS dissemination project have been encouraging. A survey at the end of the field phase (Sept/ Oct 2002) revealed a significant improvement in the SODIS users' health situation.
We have used questionnaires to assess the health and user profile in the targeted villages. Four hundred and fourty-four questionnaires were returned by SODIS users (average: 6.8% of the total village population). This particular survey did not meet internationally recognized standards in health data surveillance, but still gives an indication of how SODIS has affected the health of the people.

✪ **Diarrhea**: Villages, which were targeted by SODIS during the summer, reported a reduction of diarrhea cases to 53.1% of the previous year's cases (2002 compared to 2001). Their reduction was almost the same for all villages (40-61.5%). Villages without SODIS in their vicinity reported almost exactly the same number of diarrhea cases as the previous years (101.4%).

✪ **Hepatitis A**: SODIS villages had a reduction of Hepatitis A cases to only 39.1% of last year's figures. Control villages next to them without SODIS got an overall reduction to only 95.9%.

✪ **Health status of SODIS users**: 77.1% of the people who were using SODIS for a period of 15 days mentioned they stayed healthy. This percentage increased to the very high number of 94.5% of people who used SODIS for more than 2 months. Cases of diarrhoeal infections, Hepatitis A and worm infections got also steadily reduced with ongoing SODIS application. This indicates that people stay significantly healthier if they use SODIS over an extended period of time.

Graph 1: Water-borne diseases in the households, compared to how long they were using SODIS



✪ **Sustainability**: If people used SODIS only for a short time (up to one month), they did not see a real and measurable impact. The longer they used SODIS, the more convinced they were about the benefit of this water treatment method. After two months, only 1.2% of all SODIS users mentioned that they had not come to a conclusion yet about SODIS, and nobody decided to discontinue using SODIS. This indicates that the user's confidence and trust in SODIS increases steadily if they were taught and encouraged over an extended period.





3. Dissemination Project, Phase II 2003-2004

The following section explains the Phase II of the Dissemination Project (April 2003 - March 2004). JDA continued to build on the experience gained, and improved its knowledge of SODIS in Uzbekistan.

3.1. Planning

The project phase II was aimed towards the sustainability of the SODIS training in the villages and assessment of the user's health at the end of the phase cycle. The main goals and objectives were as follows:

GOALS

Local goals:	SODIS dissemination in the Ferghana Valley by JDA Kokand staff/ promoters. Set-up of a SODIS resource center for Uzbekistan and Central Asian States in 2003.
Regional/ national goals:	Create a network of organizations and associations that are actively promoting SODIS. Training and equipping partner organizations for their own SODIS and/or health education projects. Coordinating future SODIS activities in Uzbekistan.

OBJECTIVES

- To disseminate SODIS in 20 villages within the wider Ferghana region during the summer months as a follow-up of the SODIS Pilot Project.
- To create all necessary education and training material of a high quality and sufficient quantities by July 2003. This will include material adapted to suit the needs of medical personnel, health institutions, Water and Sanitation agencies, schools and pre-school facilities as well as for local SODIS staff.
- To organize and conduct a National SODIS workshop and regional strategic workshops for interested agencies, partners and policy makers before the hot season starts (March 2004).
- To hold seminars for partner organizations and their staff, on request.
- To set up and coordinate a network of partnering organizations within Uzbekistan, by means of email forums, "know-how" exchange etc.

3.2. Implementation

3.2.1. Preparation and Training

Selection of villages
The project was designed to reach a diverse selection of villages around the city of Kokand. We targeted 4 districts with a total of 34 villages, thus including 14 villages from the pilot project and 20 new villages. Many villages did not have an adequate water supply. People fetch water from the irrigation canals, ponds or drainage taps. Some villages do have piped water with tap posts on the streets. Unfortunately, most of these water supply systems only work if there is no power outage.
The new project sites were selected together with the head of the provincial SEN Department in Ferghana, Mr. Sobitali Jumanov. He assigned us the communities in the Rishton and So'x districts that had severe water problems and were without any gas supply. JDA and its promoters made every effort to speed up the dissemination because of the shortened SODIS season due to the exceptional poor and wet weather conditions in the spring.

Training of JDA staff
The SODIS promoters received further training in the areas of

- Communication skills
- Participatory Rural Appraisal (PRA) methodology
- Medical training about water-borne diseases and parasites
- Thorough technical training about SODIS
- Preparing and teaching lessons for schools and kindergartens
- Selection, training and monitoring of volunteers in the villages

During the project season the promoters received instructions and detailed training to further improve the quality of their work. They were eager to put into practice what they had learned, and we have even seen a certain sense of competition among the promoters to achieve the best results in their assigned villages.

3.2.2. SODIS field work in the villages

School lessons about SODIS and Hygiene
An important component of the project was to involve children in the dissemination process. Children proved to be much more open to new ideas, and they were interested in trying SODIS at home. Many have become good promoters themselves, teaching and motivating classmates and their families to use SODIS regularly.
In 2000, the Uzbek Government issued a legal order stating that health lessons must be taught in schools across the country. However, the order only outlined a list of health topics, and said nothing about implementation. For teachers with limited resources, implementing lessons based only on a list of topics was a difficult task.
JDA's SODIS promoters went to the schools in the project villages to teach two different lessons in each class. The first one dealt with SODIS and the methodology, the second one explained the relationship between SODIS and good hygiene behavior. They were well accepted in the schools. Many children were already using SODIS at home and brought their half-blackened bottles to school.

Home-to-home visits and meetings
The promoters went from home to home to explain the method and encourage the village population to use SODIS as an alternative to boiling water.



Medical staff have often accompanied them from the FAPs or QVPs (usually referred to as Village Health Posts) in the particular villages. Most of these health workers were excited about SODIS and did actively teach the rural population about the new method. It became obvious that without support from the health authorities in the villages, the promotion activities would have been more challenging, and fewer people would have regularly used SODIS.

During the summer, the promoters organized several meetings in the villages to address a larger audience.

Involvement of volunteers
An important step was to involve local volunteers in the villages. Past experiences have shown that the JDA project staff were always limited in the scope of their work. They needed the assistance of local volunteers who got excited about SODIS and were willing to become motivators in their neighborhood. This year, JDA has selected 2 -3 volunteers from each project site and trained them in the SODIS method. These volunteers were usually health workers (Para-medics or village nurses).
It was an important experience to have these local co-workers involved in the project. They knew the people in the village, were well informed about the existing health problems in the village, and were ready to look for ways to improve the people's health. Involving local co-workers increased the level of participation by the people who were profiting from the project. It also enhanced a sense of village ownership in the program.

Since the volunteers were willing to accept additional work, JDA has paid them a small fee for their efforts and support.

Information material
Following new information material was produced during the field phase:

- SODIS Brochure for adults (in Uzbek, Tajik and Russian language)
- SODIS Brochure for children (Uzbek)
- Technical Notes about SODIS (Uzbek, Russian)
- SODIS Manual (Uzbek, Russian)



In addition to that, JDA has put together a plan for utilizing different ways to advertise and teach SODIS. A lot of work has to be done yet, but some of the material consists of:

- A Poster Series about different topics, including the SODIS method
- Crossword puzzles about SODIS
- SODIS competition in schools
- Calendars for the Year 2004 as centerfolds in local newspapers
- SODIS Sign-posts at the main roads in the Ferghana Valley
- Short TV-commercials about SODIS and Hygiene
- SODIS events (Bayram) in regional center towns, etc.

3.2.3. Partnering with Officials and Authorities

SODIS will only find a wide acceptance if people in authority will actively support the new water treatment method. JDA has therefore implemented a small information campaign with the relevant people in the Education and Health Departments of the Rishton and So'x Districts. We aimed at not only get official clearance for our fieldwork, but at starting a partnership with the relevant authorities.

Education Department (HTB): JDA prepared seminars for the school and kindergarten directors of each district. One of the seminars was specifically targeting the medical persons of these institutions, who are responsible for the children's health and well being while being under their care.
Health Departments (SSB): The promoters held two seminars for all Center Hospital doctors and Village Health Post leaders in each district. They were informed about SODIS, our project in the villages and encouraged to introduce SODIS in their area.

JDA has also approached the District Governments (Tuman Hokimyatlari) to inform them about our promotion activities in the project villages. Some government officials got excited about SODIS and were very supportive of JDA.

3.3. Monitoring

Monitoring is a systematic and continuous assessment of the project's progress over time. It is a basic and universal management tool for identifying the strengths and weaknesses in a program. Its purpose is to help all the people involved make appropriate and timely decisions that will improve the quality of the work.[1]
JDA used several monitoring techniques during the project to assess our work and find ways for improvement.

3.3.1. Process monitoring: Supervision of SODIS promoters, volunteers and field activities

Regularly training events were part of the project. JDA tried to help to upgrade the staff skills, thus strengthening capacity building of all involved project staff.

The training was specifically aiming at:

- Erasing weaknesses and blind spots
- Building on personal and institutional strengths
- Taking advantages of opportunities as emerged from the field activities
- Helping to stay focused during the field work
- Enabling regular reporting

3.3.2. Impact monitoring: Reporting and SODIS Health Impact Survey

Impact monitoring is a form of continuous self-evaluation. While this report is being put together, JDA's Kokand branch office is continuing with assessing the project towards achieving the objectives and its cost-effectiveness.
However, this report sheds some light on how the SODIS Dissemination Project Phase II has affected the health situation of the target population. The report is aimed at assisting the Ministry of Health of Uzbekistan and other NGOs in their efforts to improve the physical well being of the population by describing the input and outcome of Phase II.

JDA has used an appropriate evaluation tool to measure the project impact on the SODIS user's health: a semi-structured interview. Below is an abbreviated list of the essential steps of putting together a survey that meets international standards. The survey was prepared and data got collected according to these standards.

Definition of the evaluation tool

1. Set goals and variables
2. Formulate clear questions
3. Define sampling, e.g. selection of target people (age, gender, location, social status, etc.)[2]
4. Mapping of villages

Pre-testing

5. Definition of the enumerators and their counterparts in the villages
6. Refining questions
7. Gain confidence in correct recording and interviewing skills
8. Re-write questionnaire/ Specific training of project staff



Specific training of project staff

- Continuous training, support and supervision are all essential to ensure data is collected accurately, and to ensure that people understand the use of the information they are recording.[3]
- How to do a survey.
- Asking the right questions, no leading questions, manipulating people or giving of hints.
- Recording the answers correctly and consistently to avoid bias.
- Using cross-pollination whenever possible, observing and comparing.
- Ensuring correct handling of collected forms, data entry and safe data storage[4].



3.4. Analysis and Results

The SODIS project was not only aimed at disseminating knowledge about SODIS, but also eventually having a positive impact on the local population's health. We anticipated a measurable reduction in reported cases of water-borne diseases and an improved health status.

Interviewing the SODIS users and health workers in the villages further revealed their perception of the new idea. The semi-structured interviews were based on three different types of forms: one for the SODIS users, one for the QVP personnel and another form for the assessment of the statistical health data in each project village and control group villages. Data was collected on SODIS users and village health facilities (FAPs and QVPs) over a two-month period from September to October 2003.

3.4.1. General statistics

JDA has collected following number of responses:

SODIS users	362
FAP/ QVP staff	21
Statistical data from FAP/ QVP leaders	36
Total questionnaires	**419**

Target: A minimum of 10% of all SODIS households in the project villages.
Returned and registered: Average of 15.9% (10.3 – 45.7% per village and project location).

The sample size was determined by randomly selecting SODIS users of the target community. They had to be geographically spread throughout the village to avoid assessing only families within certain proximity of water sources or epidemic outbreak of any disease. The enumerators were using simple mapping techniques to visually control the geographical diversity of the surveyed homes.

Table 1: Distribution of the Sample:

Village	Total population	# of households	# of all SODIS households	% of sample	Permanent SODIS households	% of all households	% of all SODIS households	# Questionnaires from SODIS househ.
1 Jahonobod	3093	150	110	73.3	100	66.7	90.9	22
2 Nosgar	2250	550	290	52.7	130	23.6	44.8	47
3 Pandigon	3558	791	360	45.5	190	24.0	52.8	55
4 Qalaynov	2164	314	105	33.4	67	21.3	63.8	48
5 Qayrag'och	4060	1049	380	36.2	205	19.5	53.9	39
6 Uyrat	4177	750	375	50.0	250	33.3	66.7	50
7 Malbut	600	135	75	55.6	60	44.4	80.0	20
8 Qizil-qiyoq	1850	400	270	67.5	200	50.0	74.1	28
9 Sharqobod I	980	231	131	56.7	98	42.4	74.8	29
10Sharqobod II	1245	251	176	70.1	134	53.4	76.1	24
Average				***54.1***		***37.9***	***67.8***	
Total	***23977***	***4621***	***2272***		***1434***			***362***

10 Villages, total population of 23'977 people in total 4621 households.

Gender distribution: Women 291 (80.4%)
Men 71 (19.6%)

The figures reflect the typical situation in Uzbek homes. Women are mostly responsible for food preparation and water supply in the homes.

As Table 1 reveals, more than half of the households have used SODIS during the summer (54.1%), of which 2/3 have used SODIS permanently/ every day (67.8%, or almost 38% of all households).

The enumerators interviewed teenagers as well as middle-aged people and elderly people (grandmothers etc.)

Graph 2: Age distribution of the surveyed people



3.4.2. The drinking water situation in the project villages

Access to water

Table 2: Water Sources in percent of consumed water volume.

Village	Tap water	Canal	Pond	Drainage	*Total*
Jahonobod	50.5	49.5	0.0	0.0	***100%***
Malbut	0.0	0.0	100.0	0.0	***100%***
Nosgar	40.7	14.7	17.1	29.3	***100%***
Pandigon	37.5	39.0	14.9	9.2	***100%***
Qalaynav	1.0	21.7	55.6	21.6	***100%***
Qayraq'och	97.8	0.0	1.2	1.0	***100%***
Qizil-qiyoq	0.0	0.0	100.0	0.0	***100%***
Sharqobod I	0.0	0.0	100.0	0.0	***100%***
Sharqobod II	98.8	1.3	0.0	0.0	***100%***
Uyrat	0.0	45.6	34.5	20.4	***100%***
Average	***31.2***	***20.0***	***38.2***	***11.0***	***100%***

None of the project villages have reliable access to clean drinking water. The survey and observations have shown that people fetch water from whatever source there is available.

Tap water means "Artizon" and is defined to be piped municipal water from a tap in the house or on the streets. The water should be centrally treated before distribution. However, none of the project villages have this type of water source, and "Artizon water" is usually untreated water pumped directly from shallow wells or drainages.

"Canal": could be a natural or artificial, concrete lined canals flowing through the communities. Some communities like Jahonobod and Qayrag'och are situated next to the Great Ferghana Canal, which is a source of drinking water for many.

Another observation was that sources defined as "Ponds" got sometimes mixed up with "Canal water". The reason was that ponds usually get refilled from time to time by diverting water from canals into them. People referred to ponds on the questionnaire, but were getting their water from canals feeding the ponds in the community.

"Drainage" is defined as a shallow well, usually designed to lower the ground water level. It is generally equipped with a motorized pump that delivers a fairly good flow of water, but in most cases does not reach deeper water levels. The shallow wells are often not deeper than 20 meters. People in the communities complained that "drainage water" has a bad taste, is contaminated and should not be consumed.

Ways of contamination

During the dissemination and training activities during the summer, JDA has seen several ways that contamination occurs. All the water sources were unprotected from direct contamination by animal or human beings, and most of them were also unlined to protect them from indirect contamination. Some of the most obvious shortcomings were:

- Open canals, allowing animals to have access to it
- Wells without fences, cracked or missing concrete lining or no cover
- Unprotected and unfenced ponds, often located within less than 10 meters from a pit latrine
- Water replacement cycle of ponds were to long

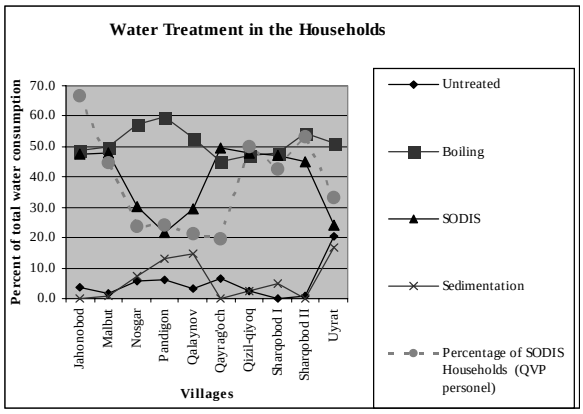
Water treatment preferences

The survey was collecting information about how people in the project villages treat their drinking water. The categories were

- No treatment/ direct consumption
- Boiling
- SODIS
- Sedimentation

People were asked to rate their preferences in amount of liters for each category, compared to their overall water consumption.

Graph 3:



The dotted line indicates the number of permanent SODIS users (specifically SODIS households, in percent of total households per village). The QVP staff in the villages gave this figure.
Differences to the triangle line (SODIS usage) show that SODIS users treated varying amounts of their daily drinking water with SODIS.

(Footnotes)
[1] *Gosling, Edwards, 2002: 81.*
[2] *Pratt, Loizos, 1992: 34.*
[3] *Gosling, Edwards, 2002: 93.*
[4] *Hubley, 1993: 214, 215.*

3.4.3. The Health Impact of the SODIS Dissemination Project

Does SODIS really help to improve the rural population's health?

This question has no easy answer, but is most important to JDA, the Ministry of Health, and our expatriate and local staff. "Helping the people in need" is part of our vision and main motivation to be involved in development projects.

Health is a complex matter to measure. Water quality is only one of many different factors influencing the health status. Epidemiological studies depend on the intervention studied (in this case, SODIS and hygiene education) and an outcome measure (the health impact). Part of the problem is the nature of the intervention. The ideal way to measure the impact of any health intervention, the double blind, randomized, controlled trial, is not feasible for water and sanitation. There is no placebo for SODIS bottles. Moreover, the unit of intervention usually has to be the community, rather than the household. Besides, it is almost impossible to allocate water supplies and sanitation at random - ethnically, politically and practically.
The principal outcome is diarrhoeal disease; by any reckoning, more than 90% of the health benefits of improved water supplies and sanitation arise from reduced diarrhoeal illness, most of it in children less than five years old. This raises other problems. Diarrhea is caused by a wide variety of microorganisms, transmitted by a wide range of different routes. Water supply and sanitation affect only some of these.[1]

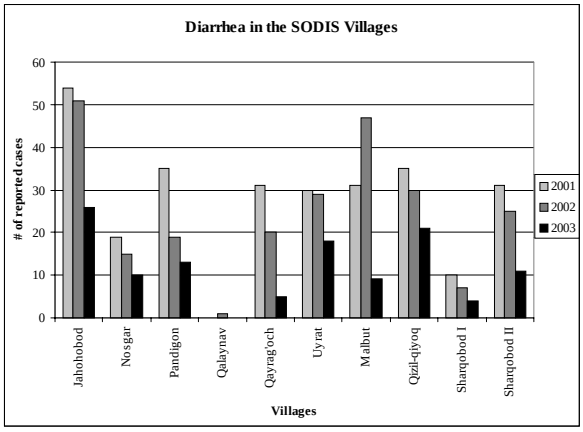
The survey took these limitations into consideration. JDA was specifically interested in the relative changes of the villages' populations' health, instead of getting absolute figures. By means of the survey, JDA was collecting the official health data from each project village. To compare the results within other communities in the same region, we got health data from a total of 25 randomly selected communities in the proximity of JDA's project villages. It would be fair enough to assume that this control group has about the same presuppositions as the SODIS project villages in the distinct districts of Rishton and So'x (by ethnic groups, wealth ranking, local hydrology, existing health programs and political structures etc.).

Table 3: Number of villages surveyed

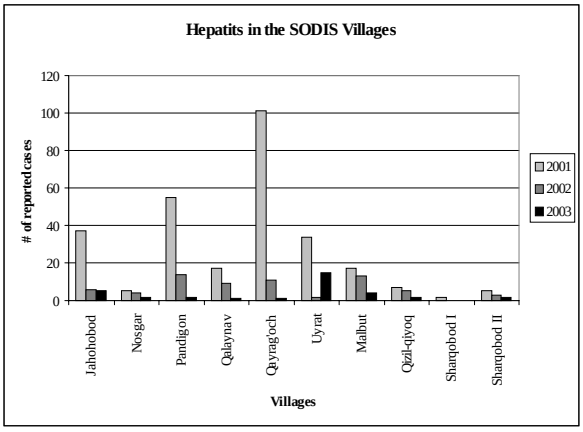
	Rishton District	**So'x District**	***TOTAL***
SODIS villages	6	4	***10***
Non-SODIS villages (control group)	16	9	***25***
TOTAL	***22***	***13***	***35***

Reported diseases in the 10 SODIS villages

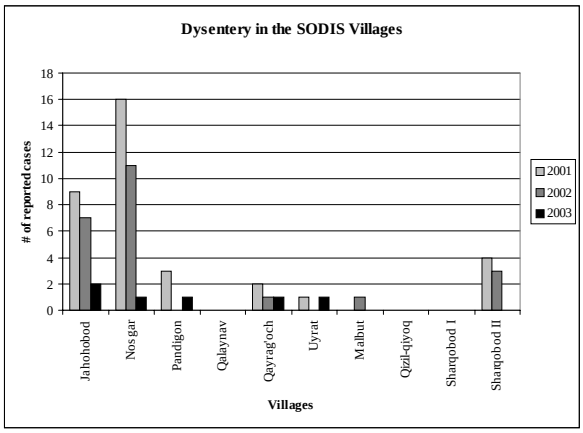
Graph 4: Diarrhoeal infections in SODIS villages



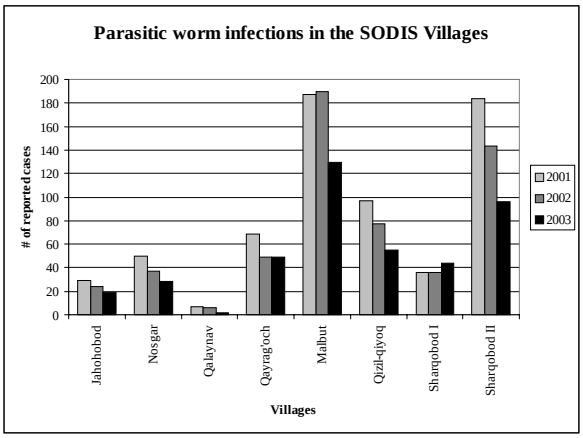
Graph 5: Hepatitis in SODIS villages



Graph 6: Dysentery in SODIS villages



Graph 7: Parasitic worm infections in SODIS villages



Summary of the various water-borne diseases in the SODIS project villages of Rishton and So'x District

Table 4: Summary of the health statistics by districts

Rishton	**2001**	**2002**	**2003**	**2002, compared to 2001**	**2003, compared to 2001**
Diarrhea	169	135	72	79.9%	42.6%
Dysentery	31	19	6	61.3%	19.4%
Hepatitis A	249	46	26	18.5%	10.4%
Helminthic infect.	155	116	98	74.8%	63.2%
			Mean	***58.6%***	***33.9%***
So'x	**2001**	**2002**	**2003**		
Diarrhea	107	109	45	101.9% *	42.1%
Dysentery	4	4	0	100.0%	0.0%
Hepatitis A	31	21	8	67.7%	25.8%
Helminthic infect.	504	446	325	88.5%	64.5%
			Mean	***89.5%***	***33.1%***

* Explanation for the diarrhea situation in the So'x District

The diarrhea cases in 2002 were almost exactly the same as the previous year. Where did this come from? It needs some consideration since all the other SODIS villages in the So'x district have had a significant reduction.
Observation: The village Malbut has had an increase of diarrhea cases by 51% in 2002 (see also graph 4 above). All the other project villages in So'x showed a reduction between 70 and 85% (mean 78.8%), compared to 2001.
Reasons: Malbut got added as a SODIS project village in 2003 only on the request of the So'x District Health Authoritiy (Rayzdrav) and replaced Navobod village. JDA therefore was only working in this community during the summer of 2003. This does explain to some extend why Malbut has an increased diarrhea count in 2002, compared to an overall reduction of 78.8% in the other SODIS villages of the same district.

The table above clearly displays a measurable and significant reduction of water-borne diseases in villages that were targeted by SODIS programs.



So'x

It is important to note, however, that introducing new water treatment techniques alone does not necessarily lead to an improvement in the health of the rural population (see pages 19 and 23). SODIS should always be "bundled" with health and hygiene education.
Even with Malbut added only in 2003, the table reveals a massive decrease of common diseases in the project villages. After two years of SODIS dissemination in the villages, cases of water-borne diseases in the project communities got reduced to 1/3 (33.1 – 33.9%) of the initial figure. This is a result that hardly can be achieved by any other water and sanitation program with that little financial and technical input. However, to assess the effectiveness of the invested funds, additional cost-effectiveness analysis would be necessary.[2]
SODIS seems to significantly improve the health situation. The results above not just confirm the figures that JDA was getting by analyzing our work of the previous year (2002), but they are even more impressive and convincing.

Do other villages show the same health improvement as the SODIS villages?

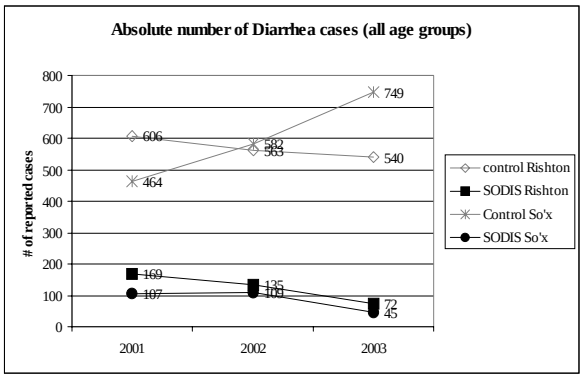
It is important to use statistical correct methods for doing the analysis. In order to get an unbiased result about the impact of SODIS in the rural communities, it is necessary to compare the health statistics of SODIS villages with a randomized control group of Non-SODIS villages, which have the same conditions and resources.

It became obvious that the different health facilities in the rural area of the Rishton and So'x districts used different systems and criteria to record the health status of the population. Most of them did not record the actual disease cases in the village, but used some sort of criteria to define if the particular occurrence or case got recorded in their health book or not. Usually the numbers in the book are lower than the real occurrence in the community. This makes an accurate analysis of the people's health across the region extremely difficult.

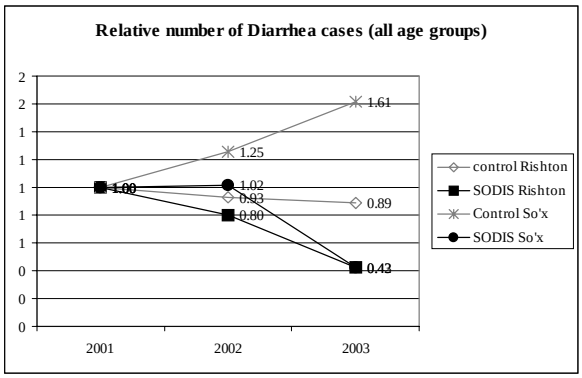
Since each health post kept using its own particular recording system for all surveyed years (2001-2003), a relative/ percentile comparison is admissible. It would give a fair indication of the health situation changes over time for each community and would allow a statistically valid comparison.

Diarrhoeal infections

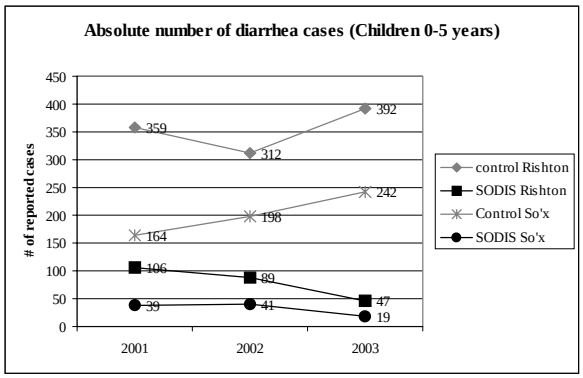
Graph 8



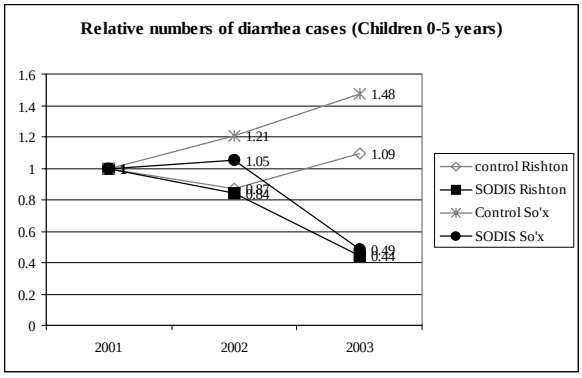
Graph 9



Graph 10:

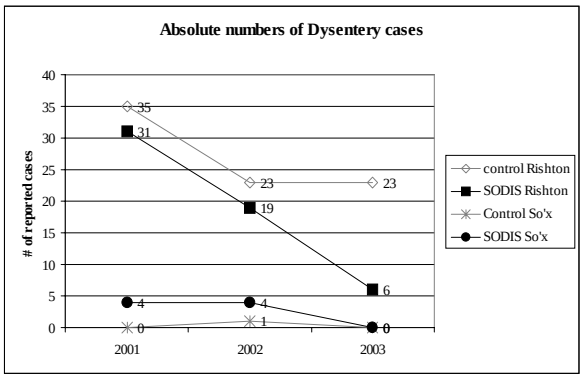


Graph 11:

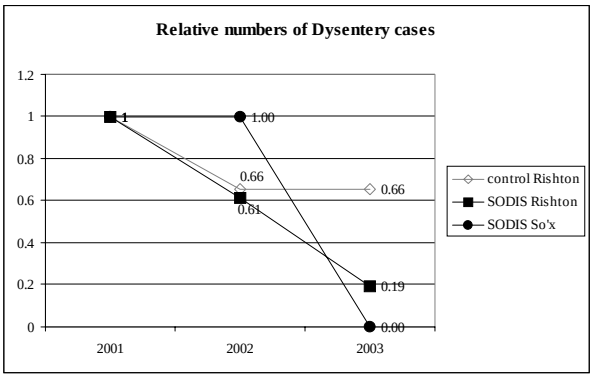


Dysentery

Graph 12:



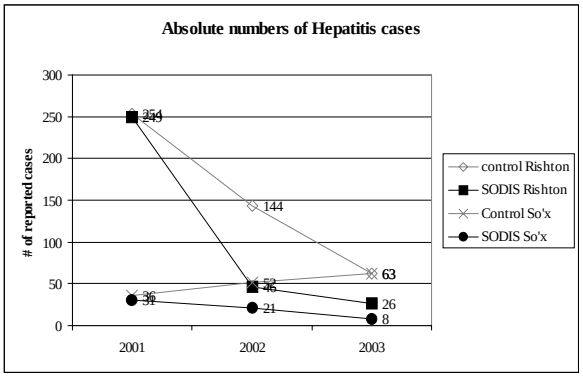
Graph 13:



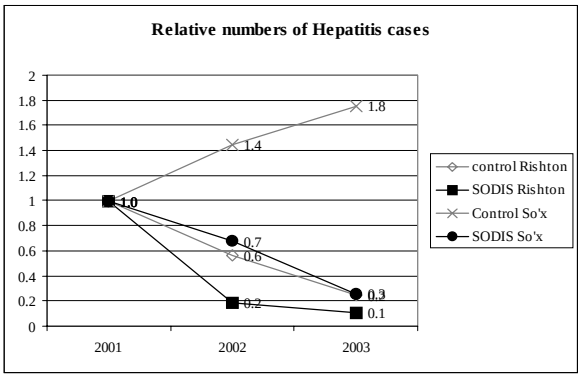
A graph for the relative number of dysentery cases of the So'x control group is not available because of not allowed mathematical operations (division by 0).

Hepatitis A

Graph 14:

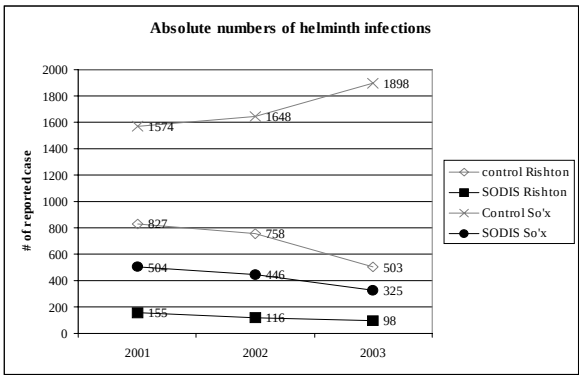


Graph 15:

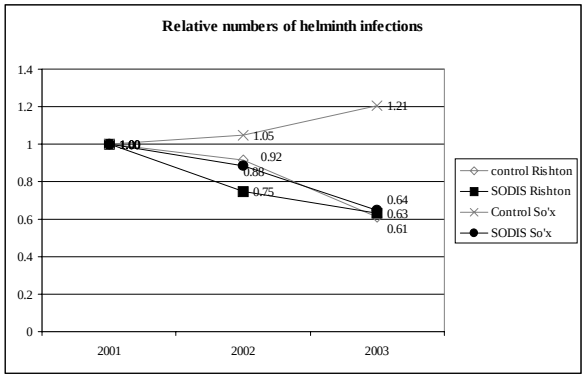


Helminth infections *

Graph 16:



Graph 17:



* Explanation for the helminth infections in boths districts:

The data on parasitic worms infestations did not get recorded in all the project or control villages. The communities with missing or incomplete data were therefore omitted from the analysis to avoid distortion of the results. Following communities got excluded from the worm infection analysis:

Incomplete data: Uyrat (SODIS), Zohidon, Do'tir

Missing data: Pandigon (SODIS), Oq yer, Bo'jay, To'da, Hurramobod, Yoyilma

Doing so, the data for helminth infections is statistically not directly comparable with data about the other diseases, because we were using different group samples.

Note: The data for worm infections is the least trustworthy health data because of the many different "strategies" of health workers of recording cases and usually unsolicited diagnosis at the QVPs.

What influence did the Hygiene Education part of the project have?

The use of water in hygiene is an important preventative measure, but contaminated water is also an important cause of diarrhea. Cholera and dysentery cause severe, sometimes life threatening forms of diarrhea. It is more common when there is a shortage of clean water for drinking, cooking and cleaning. Basic hygiene is important in prevention.

Although water-borne epidemics of disease (cholera, typhoid, hepatitis, giardia, etc.) are well-known, most of the endemic cases of these diseases in poor communities are caused by other transmission routes; contaminated food, hands, utensils, etc. A number of studies have found that when drinking water quality alone is improved, it has had limited impact on people's health - even when the previous level of pollution has been as high as a thousand faecal coliforms per 100 ml.[3]

It is therefore very important that any improvement in water quality is combined with ongoing health education. Health education programs can deal with other transmission routes beside contaminated drinking

water. In order to achieve a better health condition of the rural population, all stakeholders should consider to integrate a hygiene education/ prevention program to a SODIS campaign.
What we do know from the existing literature on impact studies is that in those cases where a significant health impact was found, the provision of water supply or sanitation had been accompanied by improvements in hygiene.[4]

Therefore, SODIS and Health Education have to go hand in hand.[5]

Analysis made by the village population

One of the questions on the survey form was: "Will you continue to use SODIS in the future?"

323 user answered with "of course", while 39 user were not sure yet. None of the 362 surveyed people mentioned that they would not want to continue.
Having said that, more than 89% of the permanent SODIS users were positive towards the new method and wanted to continue in the future. Nobody thought that they would not use it again in the next year. This is a strong argument from the rural population itself about its confidence in SODIS.

Many commented that they would like to get more information and training on SODIS. Also many people in the villages expressed their wishes that SODIS would be spread and taught to others. The main reasons for the rural population to use SODIS were ease of use, low costs, prevention of illnesses, practicality, and fitting their needs in the households.

A few comments:

- "*I wished you would teach this method next year to more people.*"
  Nosgar, Vasila Umrzoqova, age 35

- "*Hopefully many more people will use this method in the future*."
  Nosgar, Kumushxon Boboeva, age 32

- "*Everybody should know about it*."
  Nosgar, Xurshida Teshaboeva, age 22

- "*SODIS is easy to use, very practical and helpful for us*."
  Qizil-qiyoq, Numonjon Kataho'g'aev, age 47

- "*Teach this method in all villages without gas or good water*."
  Pandigon, Viloyat Mamatqulova, age 36

- "*Thank you for presenting this method. I appreciate that you have been helping us and were concerned about our people's health.*"
  Nosgar, U. Yusupov, age 40

- "*It's a very practical method and easy to use. Many people in the village like it*."
  Qalaynav, A. Maxmutalieva, age 19

- "*I wished the women in our villages used SODIS all the time. Because SODIS helps us to prevent sickness from many water-borne diseases.*"
  Sharqobod I, Sh. Madibragimov, age 25

- "*Please teach more lessons at the school and in the kindergarten.*"
  Malbut, Pardavoy Hamroboev, age 43

- "*I appreciate the little cost involved; a very practical method*."
  Uyrat, E'zoz Mirzoqova, age 26

- "*Use more TV commercials and Radio programmes, publish information in local newspapers.*"
  Uyrat, Inoyat Azimova, age 38

- "*We need more seminars in the mahalla*."
  Qayraq'och, Firuza Yigitalieva, age 19

- "*SODIS does not require much work nor time, it is perfect for our village life.*"
  Qalaynav, Ominaxon Ergasheva, age 44



3.5. Conclusion

3.5.1. Health improvement confirmed

The analysis revealed:

- Each project village recorded a remarkable reduction of water-borne diseases over a 2-year period. This confirmed the analysis done by JDA in the previous year (at the end of the season 2002. Diarrhea: minus 46%, Hepatits A: minus 61%)

- SODIS villages have had a reduction of the reported cases in absolute numbers. They also reported a substantial relative reduction (see Table 4).
  Diarrhea cases got reduced to only 42% of the numbers in year 2001, showing the same result for both districts.
  Hepatits A got reduced to 10% in the Rishton district and to 25% in So'x within two years of intervention.

- **Diarrhea in children between 0 and 5 years: This is a main indicator of the health impact. It shows a significant reduction in SODIS villages but a slight increase in the control group.**
  SODIS villages: reduced to 46.5% since 2001
  Control villages: increased by 28.4% since 2001

- Overall result of occurence of water-borne diseases in the SODIS project villages:
  Both districts reported a reduction by an average 2/3 of the cases in the year 2001 (see Table 4). SODIS therefore provides an excellent way to improve the health situation in the rural communities.

- Rishton: The control group does also show a reduction for Dysenteria, Hepatitis and worms, but not as remarkable as in the SODIS villages. There is even an overall increase of diarrhea cases, both for all age groups and for children of 0-5 years.

- So'x: The health situation is more challenging in So'x than in other districts of the Ferghana Viloyat. All statistically counted cases of water-borne diseases increased over the two years (Diarrhea, Hepatits A, worms etc.). This seems to be mainly a problem of lack of adequate water supply and poor hygiene behaviour, but it would need more specific research to explain this change for the worse.
- There is a different tendency in the health status of SODIS communities and villages without SODIS. The project villages recorded a consistent decrease of water-borne diseases of 66% after 2 years (except Malbut, see explanation above). The control group reported an increase by an average of 52%.

This study is a first step in analyzing SODIS projects' impact on users health in the former Soviet Central Asia.

Unlike administrative health data, the data collected for this study provides a unique opportunity to link input in water treatment to improvement of the health status of users in the communities. Because the study is not based on a random sample of SODIS villages or village health data, it may be difficult to generalize the results. The results do raise important questions, however, that should be explored using a more detailed analysis of the individual user's health data, supplemented by additional qualitative research.



Even given imperfect statistical methods, the results of the study show convincingly that:

- **SODIS communities reported more than half of the population using SODIS during the summer, and 38% of all households were using SODIS every day.**
- **People were using SODIS beside other treatment techniques like boiling, sedimentation etc. Between 20-50% of the daily water consumption was treated using SODIS.**
- **SODIS is an excellent method for villages without adequate water supply systems or gas or electricity supply.**
- **SODIS users reported health benefits for themselves as well as for their families.**
- **More than 89% of users want to continue after the winter break.**
- **Project villages were having significantly fewer diseases caused by water-borne pathogenes than villages without SODIS in their immediate vicinity. They have reported a reduction by 2/3 within two years, compared to little change in the Rishton district and increased numbers of cases in the So'x district.**
- **Given the standard category of diarrhoeal illnesses in children of age 0-5, SODIS communities reported a decrease to only 46.5% (since 2001), as the control group of Non-SODIS villages reported an increase by an average of 28.4%.**

SODIS has the potential to become a widespread alternative to boiling water in Central Asia. It is a simple, cost-effective method that saves natural resources and could easily be applied in every household. It puts responsiblity for the people's health back into their own hands. It creates capacity building by introducing new, appropriate technology to countries in transition.
SODIS does also help to empower the rural population by helping them solve their drinking water problems. It is sustainable on the community level, because it only requires some training and locally available resources at low costs. Trained users can then take over ownership of programs, as they become excited about their newly gained skills and start to teach others. Ownership can further be enhanced by involving the rural population in designing, execution and monitoring of the SODIS project in their community.

SODIS is more than just a low-tech, low-cost water treatment method. It is an integral package of education systems on water and hygiene and needs to be recognized and endorsed by all stakeholders. In essence, it requires an inter-sectoral approach within national education, health, water and sanitation departments. Other actors such as NGOs, international agencies and the private sector could also play a role. Overall, the potential of SODIS needs to be recognized at all levels, but it certainly needs to be supported and advocated by the Government of Uzbekistan to ensure long-term sustainability.

According to Sobsey[6], the most promising and accessible of the technologies for household water treatment are:

* Filtration with ceramic filters
* Adapted slow sand filter called BioSand filter
* Chlorination with storage in an improved vessel
* Solar disinfection (SODIS) in clear bottles by the combined action of UV radiation and heat
* Thermal disinfection (pasteurisation) in opaque vessels with sunlight from solar cookers or reflectors
* Combination systems employing chemical coagulation-flocculation, sedimentation, filtration and chlorination

Boiling of water is not included because:

* fuel is often expensive; fuel consumption leads to environmental degradation (if firewood is used) and (indoor) air pollution; and firewood collection is time consuming.

3.5.2. Lessons learnt

This section is making use of the understanding that has emerged from the evaluation of JDA's SODIS program phases. The following are some of the major lessons JDA has learned about SODIS to date:

General observations

- Be aware of the importance of interventions to prevent water-borne diseases.
- Villages with the worst water supply situation were most receptive.
- SODIS is a low-tech method but still needs careful introduction and training.
- People tend to accept fancy and high-tech methods quicker, even if they quit working soon after.

Project management

- Start early in the year (March or April).
- Select villages carefully.
- The communities must organize themselves if they are to meet collective needs. Local responsibility is desirable in design, execution and monitoring of any water supply project.[7]
- Move towards group "ownership" of SODIS projects.
- Ongoing training and upgrading of involved staff and volunteers.
- JDA has to improve the monitoring/ accountability structure of the program. Systematic monitoring and evaluation is a must.

Education and training

- Trainers/ promoters have to fully understand the technical and microbiological aspects of SODIS.
- There is a need for well-understood "hardware" (SODIS method) in combination with "software" (Hygiene Education)[8].

- Teaching the few but important “rules” of the SODIS process well and repeatedly.
- Use many different teaching and information techniques.
- Communication messages should be targeted on the person(s) within the household who will make decisions or act upon the information.[9]
- Technical information in different languages has helped to increase the credibility of the SODIS method.
- Getting the children and open-minded families into the centre of development.
- Children in the villages accepted SODIS very well. They were more than willing to do something about their own health, especially since it was fun to handle the bottles.
- Children could provide SODIS water independently from their parents’ intervention.
- Adults need more information and material until they fully accept the new method.
- If teachers got motivated, they were great encouragers and promoted SODIS in their schools. Schools were one of the best entry points into villages.
- It was important to include the QVP personnel into the dissemination process. They usually got very excited about SODIS and became promoters themselves.
- Need for commitment, training and monitoring by local teachers and QVP staff.

Networking with partners

- Equipping volunteers to serve as agents of change within their families and community.
- Informing policy makers on SODIS and obtaining their support.
- Acknowledging local and regional authorities who support better health practices.
- Actively involving existing health structures and authorities in the promotion process, such as the various ministries, NGOs, and others.
- Need for co-ordination and collaboration on all levels.

So, who needs to take action now?

(Footnotes)

[1] *Esrey, Feachem, Hughes, 1985: 63.*
[2] *WHO, World Health Report 2000: 54.*
[3] *Well Facts sheet: http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/btw.htm*
[4] *Well Facts sheet: (http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets.htm), and Esrey et al., 1991: 609-621.*
[5] *Esray, 1996: 56.*
[6] *Sobsey, 2002.*
[7] *Golladay, 1980: 23.*
[8] *Cairncross, 1995: 25, 26.*
[9] *Golladay, 1980: 47.*

4. Recommendations

SODIS inevitably faces a number of challenges from the social, political, institutional, technical and financial perspectives. The future of SODIS dissemination in Uzbekistan and beyond depends on how the challenges can be addressed and overcome by the joint actions of JDA, the Ministry of Health of Uzbekistan and other international or national NGOs.

Recommendation to the Government of Uzbekistan, represented by the Ministry of Health of Uzbekistan

We call upon the Government to make it a time of action by taking concrete measures that contribute to:

- Reducing endemic diseases caused by water-related pathogens by 40% by the year 2006;
- Reducing by half the proportion of people without access to adequate and safe drinking water and sanitation by 2015;
- Improving the health conditions to reduce the risks that lead to the death of thousands of children every year due to poor access to safe drinking water;
- Mobilizing and investing adequate resources to finance drinking water supply and sanitation;
- Embracing a focus on prevention by introducing low-tech, low-cost methods;
- Officially accepting SODIS as a viable and appropriate water-treatment method for rural areas of Uzbekistan;
- Actively promoting a structured, people-centered approach for a nation-wide SODIS dissemination, health and hygiene education appropriate to the rural population's abilities and learning preferences;
- Actively co-operating with JDA and other stakeholders to promote SODIS nation-wide;
- Placing high priority on the needs of children;
- Implementing a demand driven approach to address the real problems in the rural communities;
- Involving all stakeholders in developing an inter-sectoral approach that includes the education, health, water and sanitation sectors.

These recommendations are based upon the outcome of the Dushanbe International Freshwater Forum, held on the 1st of September 2003.[1]

Recommendations to other international agencies, the private sector and other stakeholders

We call upon all stakeholders in the education, health, water and sanitation sectors to taking concrete measures that contribute to:

- Reducing endemic diseases caused by water-related pathogens by 40% by the year 2006;
- Reducing by half the proportion of people without access to adequate and safe drinking water and sanitation by 2015;
- Actively seeking a partnership for inter-sectoral information exchange;
- Assisting each another with skills, knowledge and expertise exchange to further improve our programs;
- Implement further studies in the effect of SODIS on the rural population's health.
- Disseminate SODIS across Central Asia by including it into the existing and new water and health education projects.

JDA is becoming a catalyst for SODIS implementation in Central Asia. JDA is in a unique position to further spread the idea and knowledge of SODIS, not only throughout Uzbekistan but also to the adjacent countries in Central Asia, including the suffering population of Afghanistan. Because of the poor health situation, a reliable, easy-to-use treatment method is an urgent need in many rural villages.

Good ideas that need to result in behavior changes must be linked with ongoing education and training. The expertise we have gained and our understanding of SODIS puts JDA's Kokand branch into a strong position to make SODIS widely known.

Governmental and non-governmental organizations in all the Central Asian republics together with international donor community have responded to the rise of emerging and reemerging infectious diseases by numerous interventions. Despite timeliness, technical feasibility and political support for such interventions, an effective comprehensive system of infectious disease control and prevention is yet to be established in Central Asian regions.[2]
JDA's SODIS project could serve national and international NGOs as a possible model for implementing a SODIS dissemination project in their particular area.

Please do not hesitate to contact us for further information. We're looking forward to assisting you and also learning from your own experiences.

(Footnotes)
[1] *http://www.freshwaterforum.org/results*
[2] *USAID: Central Asia Infectious Disease Network. USAID Program for Control and Prevention of Infectious Diseases in Central Asia*

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