



**WATER, SANITATION, HYGIENE & HEALTH
STUDIES PROJECT**

Aga Khan Health Service Northern Areas & Chitral

Fifth Progress Report

January to June 1995

822 -PK 95 -13309



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INTRODUCTION

This report covers the period January to June 1995. In spite of an extremely cold and prolonged winter which caused great suffering in Baltistan, good progress has been made with most of the Project activities. One area where progress has not managed to keep to schedule has been the completion of writing tasks. Several staff made efforts to improve their English abilities by participating in classes organized for AKHS staff, but the priority given to fieldwork made it difficult to attend regularly.

A significant achievement that all professional staff contributed to was the preparation of a draft Water and Sanitation Implementation Proposal. This was presented at a Proposals Workshop in Gilgit in June, attended by representatives of AKF Pakistan, Geneva, U.K. and Canada. The development of a Concept Paper and an outline Proposal which preceded the draft, was facilitated by the consultant Mr. Eric Dudley who also assisted a participatory mid-way review of the Project. The outline Proposal was presented to the Chairpersons of AKHSP, AKHBP, AKRSP and senior staff of AKFP in May.

At the beginning of the year it was announced by the MLGRD that the Federal Support Unit for the water and sanitation sector, supported by the World Bank, had been discontinued. In the absence of this body the Project has developed closer links with the World Bank RWSG - SA and with the MSU. Assistance to the SAP has continued and senior staff attended the three monthly review meetings that took place during the period of this report. The Project Liaison and Advisory Committee met on two occasions, in January and in April.

Administrative matters

As planned in 1994, three additional staff were recruited in the first quarter of 1995 - an assistant engineer, a driver and a chowkidar. Also a generator and photocopier were installed together with an additional desk top computer and a lazer printer.

Transport maintenance costs have tended to be much higher than anticipated especially for the second-hand vehicles purchased in 1994. A stock of additional spare parts will have to be organized in 1996 if the Land Rovers are to be maintained in good running order for 1997 and beyond.

Consultants and staff training

Two consultancies took place during the second quarter and arrangements have been made for two others for the third and fourth quarters. Mr. Eric Dudley visited in April to assist with an internal evaluation and with the development of the implementation proposal. In June Mr. Bob Reed from the Water, Engineering and Development Centre (WEDC) led a practical ten day training course dealing with design and construction for spring protection, on-site sanitation and basic design principles for gravity flow systems.

Study visits, workshops and conferences

In February a study visit took place for 'south to south learning'. A group of two engineers and two social scientists went to Nepal to learn from the experience of water and sanitation projects. Nepal was selected because its physical conditions are similar to the Northern Areas. Also because several organizations working there are well known for their technical design, construction, and participatory implementation expertise in gravity flow water supply schemes.

The team visited six organisations in different parts of the country. All were very hospitable and full cooperation was extended to the staff. To make the experience as practical as possible several two to three day field visits were made during which discussions were held with villagers and field staff. Gravity flow systems, spring protection and pit latrines were observed in construction and in use.

For the team members it was a valuable and stimulating visit. Having different interests and perspectives each team member focused in a complementary way on different aspects.

Some of the salient 'lessons learned' include:

- Several organizations in Nepal could provide training either in Nepal or by visiting the Northern Areas.
- Interesting construction techniques are in common practice such as ferrocement water tanks and small spring protection sites.
- Throughout Nepal High Density Polyethylene (HDPE) pipe is used for drinking water supply. This is durable and flexible and it has certain advantages that make it a promising product for application in Northern Pakistan.

An extensive tournote, a set of documents, a photo album and a series of slides are available in the WSHHS Project office.

In March two of the Project's microbiologists made a training visit to the International Centre for Diarrhoeal Disease Research (ICDDR) in Dhaka, Bangladesh. Unfortunately due to communication difficulties and unrest in Dhaka the objectives of the training were not fully achieved. Nevertheless the staff returned having acquired new skills that they have subsequently been able to put into practice in their day to day work.

After both study tours the concerned staff gave presentations to the other team members about their experiences in Nepal and Bangladesh.

Three senior staff attended the AKHS Annual Conference in May where they gave presentations about the work of the WSHHS Project. In March the sub-engineer from the Baltistan office attended a five day training workshop on community participation for rural water supply implementation organized by the MLGRD in Islamabad.

PRACTICAL SANITATION INVESTIGATIONS

i) Twin-pit compost latrines

The nine families with experimental twin-pit compost latrines in Gilgit and Baltistan all began using the second pit after the first pit had filled up. The contents of some of the first pits will be completing a one year retention period during the last quarter of this year at which time they will be investigated. For comparison purposes one latrine in Misgar will be emptied after six months. Samples of the pit contents will be taken for examination of the total number and viability of *Ascaris lumbricoides* ova. Additional parameters such as pH, temperature, moisture content, smell, flies and appearance will be assessed and compared with the traditional systems. A report will be produced presenting these findings in October.

ii) Ventilated pit latrines

After the dialogues held in four high altitude villages in Chitral at the end of 1994, eight families began constructing their latrines in spring. For reducing costs, a traditional mud-timber roof replaces the GI roof used in the ten earlier latrines. In addition, some changes to the design have been made to improve the functioning of the latrines. For example leaving a space between the lid and the surface of the squat hole to assist ventilation. This idea and others emerged from discussions with the consultants who visited to the Project in April and June.

In Ghizer village dialogues on the subject of pit latrines started in spring with the help of AKHS field staff. The photograph below shows a dialogue in Sandi Bala where models of the latrines are used to explain the systems to the community. As a result three villages were selected for introductory trials of ventilated and simple pit latrines. Five families have started construction in one of the villages. It is expected that these latrines will be completed by the third quarter of this year.



Figure 1: Dialogue on the Ventilated pit latrine in Sandi Bala

iii) Traditional Balti latrines

In Baltistan, staff assisted the Marafie Foundation, a local NGO, in conducting public meetings and dialogues in Marapi village, Shiger valley to identify appropriate sanitation interventions. As a result, plans are being developed with the Marafie Foundation for the improvement of four traditional Balti-latrines and for the construction of four communal bathrooms in the village.

iv) Minimum options

In early spring staff discussed ideas for "zero" cost sanitation for economically poor families. This was prompted by a request from LHVs for technical support so that they could better advise families trying to improve their sanitation. A set of possible minimum improvement options were identified. To gauge their acceptability these options were discussed with LHVs and communities during group meetings in Ghizer and Gilgit. The initial response of villagers was generally unfavourable. There was greater interest in more elaborate latrines. In order to progress this activity it is proposed to introduce these 'do it yourself' options through LHVs, who will work with CHWs and small groups of interested families. The first trials are planned to take place with health centre staff in Ishkoman. In autumn it is planned to organize an orientation and planning workshop on sanitation for AKHS field staff.

v) Monitoring the experimental sanitation systems

The pit latrines in Chitral have been monitored every month by the field engineer since September 1994. Visits are made to each household to observe conditions and to seek the users' comments about their new facility. A specially developed monitoring form is used to record this information. In Gilgit the monitoring of the twin-pit compost latrines has been less regular because householders complained about frequent visits of male staff.

To complement these efforts, special one-off visits to the latrine sites in Chitral and Gilgit were made by a female anthropologist in late winter. It is planned to repeat these visits in mid-summer. The aim is to obtain additional opinions and suggestions from both male and female family members and to observe the condition of the latrines. Neighbours' opinions about the new sanitation systems are also solicited during group meetings. Generally the response of owners and neighbours has been positive and several requests have been made for assisting the construction of additional latrines. Critical comments, for example about the location of latrines, will be attended to in the next phase of this work which will consist of preparation for integrated implementation on a larger scale.

For the twin-pit compost latrines data was also collected on the amount of material added to the pit, such as soil and ash. For this the pocket chart exercise was used (Fourth Progress Report, page 23). Over a period of three months the quantity of material was recorded by counting small tokens that were put in pockets on the chart. Results of this exercise showed that large amounts of dry soil were added to the latrines in Oshikhandaas, whereas this was not the case in Hunza.

DRINKING WATER SUPPLY : APPLIED RESEARCH

i) Social Action Programme (SAP)

In February, after a long, harsh winter implementation activities for the Social Action Programme were resumed. As explained in the Fourth Progress Report the SAP is executed by the Government of Pakistan line departments. The SAP water and sanitation component for Northern Areas is implemented by the LBRDD in partnership with AKRSP. The WSHHS is assisting AKRSP to accomplish this task.

In April the Project engineer organized two training workshops on improved surveying techniques for LBRDD district and sub-engineers. In the same month staff coordinated with the World Bank RWSSG in organizing a workshop on computerized design of piped water supply schemes.

In May fieldwork started with second dialogues in Ghizer and Gilgit districts. In four villages dialogues were held and a technical survey of each village was conducted. Staff of AKRSP and the WSHHS Project facilitated the dialogues by working alongside LBRDD field staff in the participatory project planning and surveying with the Abney level. After the first series of technical surveys, AKRSP and LBRDD staff started entering the topographical data into the computer and designing systems with the help of the BRANCH programme. Back stopping was provided by the Project Engineer.

Senior Project staff continued to play an active role in the monthly SAP review meetings and comments were provided on request on the SAP PC-1. At the June MRM it was announced that the Northern Areas Administration would not be providing funds for system rehabilitation. This results in a major gap in the SAP RWSS strategy. In the next half year it is expected that the Project will continue assistance with the dialogue process and in the technical design of the schemes.

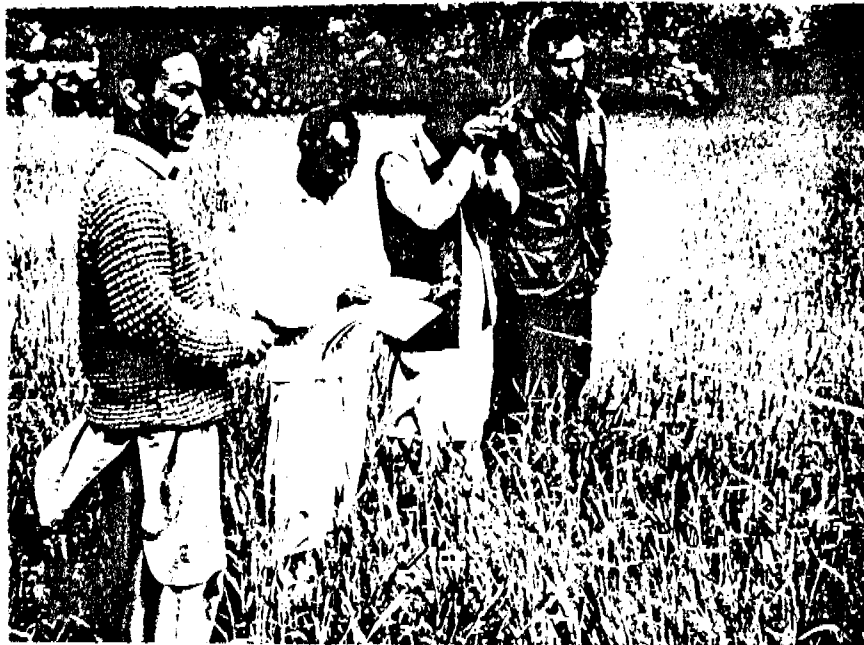


Figure 2: LBRDD engineers using the Abney level during a SAP water supply scheme survey in Gulmuti

ii) Traditional water pits

The water quality sampling conducted in over a hundred villages has shown that traditional water pits are the most contaminated source of drinking water commonly used throughout the year (Third Progress Report, page 18). Contamination levels are generally much higher than that of the channel water at the time of filling the water pits. The main reasons for this are thought to be the unhygienic water collection practices and the difficulty of cleaning the water pits. Considering how common these pits are, the Project has commenced investigating the possibilities for their improvement. An internal workshop was held to discuss information from the different regions about the existence and usage patterns of the water pits. After discussing various ideas for improvement and appropriate locations for this work, plans were made for commencing trials in July 1995. Approximately ten communal water pits will be up-graded in four different villages. Weekly water quality sampling started in April and this will be repeated after upgrading to assess the impact of the improvements. Depending on the outcome of these experiments plans will be drawn up for a second phase. Practical recommendations that can lead to clear benefits will be widely disseminated to other pit users.

iii) Spring protection

Results of the water quality sampling have shown that unprotected springs close to inhabited areas are frequently contaminated by human and animal activity. In the past, it has not been the normal practice to harness water for gravity flow systems from properly protected springs. Plans were made in mid-1994 for introducing spring protection at six sites in 1995-96. Two sites in Chitral, two in Gilgit and one in Baltistan were short-listed in February and subsequently it was decided to work at four of these in 1995. In June, after several unavoidable delays, a practical training course took place in Gilgit which covered design and construction aspects of spring protection. The ten day course, given by a trainer from the Water, Engineering and Development Centre (WEDC) U.K., was made available to interested staff from LBRDD, AKHBP and AKRSP. The rough designs prepared during the practical field exercises were finalized afterwards and construction is planned to start in August. The villagers have already agreed to contribute unskilled labour and local materials. Pre-implementation and post-implementation water quality sampling will be carried out to verify the benefits of this intervention.

iv) Community management research project

In January Project staff involved with this activity met in Rawalpindi with the coordinator from the International Water and Sanitation Centre (IRC). The purpose of the meeting was to discuss the work plan and budget for 1995, the formation of a National Reference Group, and the community selection criteria. In the same month, meetings were held with LBRDD, AKRSP and AKHS in Gilgit to gain a clear picture about community-managed water supply systems in the area.

In February, field work was carried out in four communities in Ghizer district to collect general information about the communities, to pre-test selected PRA techniques and to assess the communities for their suitability for this participatory action research project. The process was then repeated in Skardu district in four short-listed communities there.

In March, the researchers attended a Regional Workshop in Kathmandu with the members of the Nepal team. The main objectives were to discuss and to practice PRA techniques and to finalize the selection of four research communities in Nepal and four in Northern Pakistan.

After returning from Nepal, indepth investigations began in the selected communities of Hasis and Pakora in Ghizer, and Ghaziabad and Hoto in Skardu District. During the investigations, a standard checklist and a variety of PRA techniques were used for collecting detailed information about the communities, for identifying their problems and for learning about their methods of problem-solving. The process and outcome of the research has been recorded in detail and the pros and cons of different PRA techniques have been noted. In the coming months additional information will be collected about the communities, about their problems and the causes, and about problem-solving strategies used by the communities. The problems identified will then be prioritized with the communities and strategies will be developed with them for tackling their drinking water supply problems with respect to their water supply systems.

v) Water and sanitation inventory

The collection of data for the water and sanitation inventories continued during the period under review. At present over 700 villages have been included (80%). A number of villages have been excluded from the inventory because of their remote or geo-political location which makes visiting them difficult. After the summer it is expected that the data collection will be completed in the remaining 200 villages. In June a computer programme was finalized which enables easy access and analysis of the data. For example it automatically calculates the number of households with access to water supply, the number of schemes that are out of order, number of households having pour-flush latrines etc. A report presenting the findings of this activity will be finalized in the fourth quarter of this year.

DRINKING WATER QUALITY : RESEARCH AND DEVELOPMENT

i) Village water treatment pilot study

About half of the water sources in the area become turbid during the summer months. Some of these sources have turbidity levels up to 2000 TUs for three to four months. Under these conditions people generally use traditional water pits for reducing turbidity by settlement. However, results show that these pits are heavily contaminated with faecal organisms and turbidity levels are still high (between 200-1000 TUs).

For turbid water sources traditional methods of bacteriological treatment by slow sand filters (SSF) and chlorination have been proved not to work unless methods for reducing turbidity are first applied. Unfortunately there is little experience of treating waters with such high turbidity. After consultation with other researchers it was proposed that dynamic roughing filters (DyRF), up-flow roughing filters (URF) and horizontal roughing filters (HRF), should be tested to determine their suitability for pre-treatment of local water sources. It was decided that performance should initially be tested by a pilot study and for this purpose a scaled-down modular plant was finalized in March and put into operation in April. The system works by gravity flow and does not require any chemicals.

The plant consists of five components: a sedimentation tank (ST) and a DyRF connected to two alternative systems. The first has a three stage URF followed by a SSF. The second has a HRF connected to a separate SSF. Figure 3 shows the layout and Figure 3a the flow chart of the plant. To test the performance of the different components they are being subjected to higher than average recommended filtration rates as shown in Table 1.

Component	Filtration / surface loading rate (m/h)		Flow rate (l/min)
	Actual	Recommended	
Sedimentation tank	1.0	0.2 - 1.0	12.0
Dynamic roughing filter	3.7	1.5 - 3.0	11.0
Upflow roughing filter	0.72	0.3 - 0.75	3.0
Horizontal roughing filter	1.0	0.3 - 1.5	8.0
Slow sand filter	0.24	0.1 - 0.2	1.0

m/h = meters per hour l/min = liters per minute

Table 1: Operating parameters for the different components of the pilot plant

The ST has a theoretical retention time of 1 hour and 15 minutes for an incoming flow of 12 litres per minute. Tracer studies have shown short-circuiting of part of the flow after 5 to 10 minutes which indicates the need for a greater length:width ratio and for improving the inlet structure to distribute the flow more evenly.

Due to a prolonged winter and a cool spring, turbidity did not reach the expected high levels in June and remained below 750 TUs. In July however, the raw water turbidity is usually 1500 TUs with peaks up to 2000. Turbidity data is being collected at 13 different sampling points at 2 hours intervals during the day. Bacteriological sampling is performed once a week at 7 different points. Initial performance has been very encouraging with the exception of some operational difficulties with the DyRF due to overloading. This results from operating at higher than the maximum recommended filtration rates which has been necessary to obtain the required filtration rates for the downstream components. For reliable functioning, the DyRF is drained once or twice a day and the filter surface is washed.

Generally, about 25 percent turbidity^{reduction} is achieved by the ST and a further 25 to 30 percent by the DyRF. Each of the three stages of the URF progressively reduce turbidity, and performance to date has produced without fail water with less than 5 TUs at the entry to the SSF. The URFs have been drained once every seven to ten days to clean them and no appreciable head losses have been observed so far.

The HRF which has three sections, has performed even better, producing completely clear water at the outlet of the second compartment. For turbidity removal HRF is known to be more efficient than URF but the ease of operating, cleaning and maintaining URFs makes them a more practical option for village application.

Monitoring of the pilot plant will continue for the next four months and the results will be used to help design two full-scale treatment plants. A consultant from CINARA Columbia is scheduled to visit in July to assist this activity.

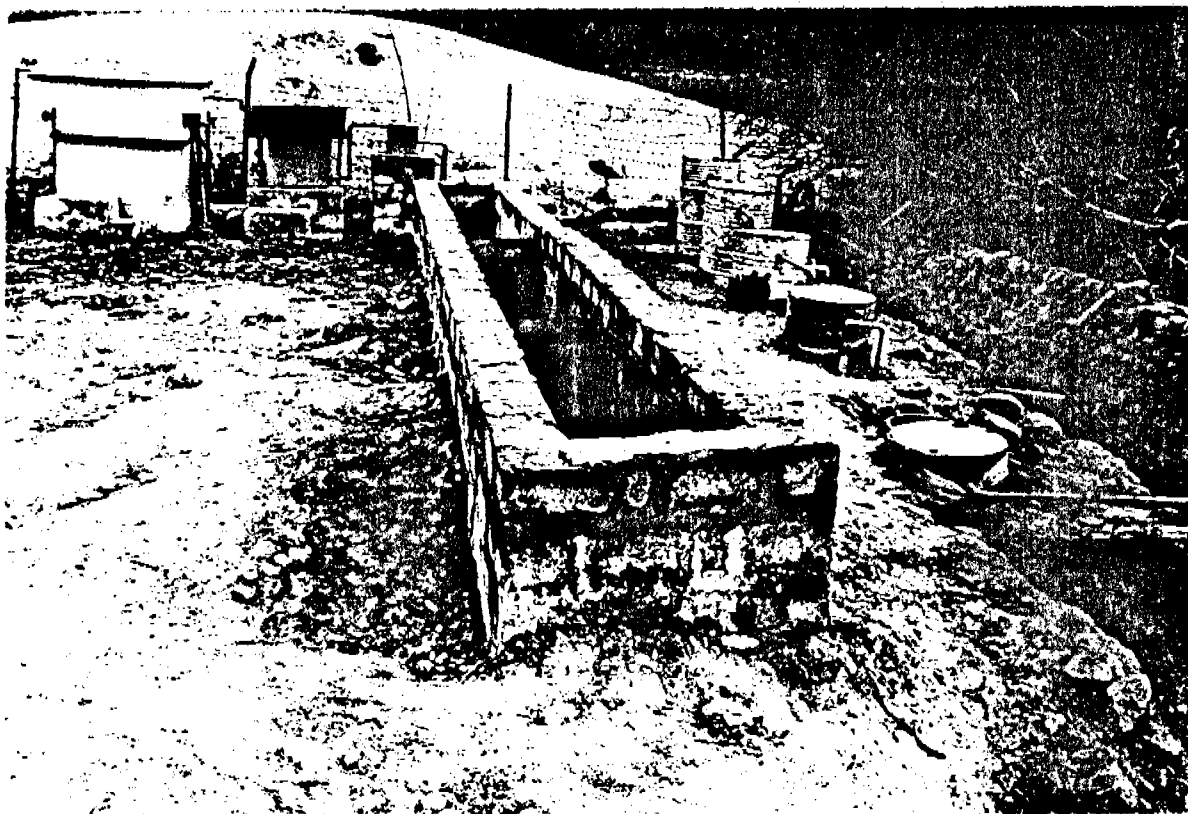


Figure 3: A view of the pilot plant in Danyore

ii) Site selection for full-scale water treatment trials

A series of visits to villages in Gilgit region were made for collecting data and for holding dialogues to discuss the possibility of community implementation of a full-scale experimental water treatment system. The villages shortlisted were Nasir Abad, Khana Abad and Murtaza Abad in Hunza; Pakora and Japuke in Punyal; Sadruddin Abad and Madinatulkarim in Nomal. Japuke has been selected for one site and pre-implementation water monitoring started in May. The second site will be at Murtaza Abad or Sadruddin Abad where periodical monitoring is also in progress. In most of the dialogues, villagers expressed their pre-occupation with existing commitments to other AKDN and Government self-help activities. In most cases the community are expected to contribute un-skilled labour, local materials and land. Their willingness to donate the latter is diminishing due to its increasing value. Construction of the first full-scale system will commence in August.

In addition to the construction of two new systems in 1995, two AKHB Water Filtration Units (WFUs) in Sumal and Oshikhandaas were scheduled to be modified. It was planned to begin this work in Sumal during the first quarter of 1995 but dialogues with the community revealed a serious deficiency of the drinking water distribution system affecting about 40 households. The villagers have decided to try to resolve this problem first before tackling modification of their WFU and a written resolution was signed by 40 people and delivered to the Project. At Oshikhandaas (WFU2), after assessing the water quality and water demand requirements, it was concluded that the proposed modifications to the existing system are unlikely to achieve the improvements desired by the community. Probably some additional

components will be needed the details of which will be elaborated using water quality data gathered at the site and the results from the nearby pilot study. The possibility of expanding the system to meet the requirements of additional households (connected to WFU1) is being investigated. Besides technical feasibility, community organisation and unity, and the availability of extra land will be important factors in making the final decision.

iii) Water quality investigations

Weekly sampling in two villages in Gilgit, Chitral and Baltistan regions has been in progress since early in the year to obtain a detailed picture of the variation of water quality and the factors contributing to these changes. In each pair of villages one has a piped water supply system and the other has a traditional system of channels and water pits. A detailed report will present the findings at the end of the study in December. Some preliminary observations are as follows:

- Bacteriological contamination levels of channels tend to steadily increase from February onwards.
- The levels of bacteriological contamination in channels are low early in the mornings and they rise steadily during the day. Peak levels occur in the afternoon with increases of up to ten times the early morning levels.
- Turbidity increases from low levels in January to mid-May to high levels in June. Occasional reduction in turbidity levels occur when the ambient temperature falls below normal for a few days.
- In both channel and piped distribution systems bacteriological contamination levels increase from source to the end point. This increase is higher for channels systems. Extended monitoring of two neighbouring villages that use the same source shows that the contamination level in the channel can be as much as ten times higher than in pipes by the end point of the systems.

iv) Household water disinfection

The final series of detailed laboratory tests on the Musaffa water decontamination bag were concluded in March. The results confirmed the earlier conclusions listed on page 17 of the previous Progress Report. In May, at the request of AKHBP, a draft set of messages for the guidance of users of the bag was prepared. Plans were also made for checking the bag's performance in practice by random sampling of households regularly using this water treatment device. A list of villages and households has been requested from AKHBP. The final report which was originally scheduled for March has subsequently been delayed.

In June, a second round of trials were performed with single pot chlorinators to see if better results could be achieved. Sodium hexametaphosphate was added to the bleaching powder and sand mixture but the results were just as disappointing as the first trials. An article to disseminate the findings is proposed.

The boiling trials carried out in Gilgit (altitude 1500 metres) on clear but contaminated water in December 1994, were repeated in Skardu (2200m) in March. The results showed that fifteen seconds at a rolling boil was sufficient to destroy all E-coli organisms. In July the tests will be repeated on turbid water. Until more is known about the specific diarrhoea causing organisms in people's drinking water, a boiling guideline for the area cannot be specified.

COMMUNICATION

i) Health education training and follow-up for LHVs

In March a start was made with a series of on-the-job training workshops on participatory health education. Two groups of Lady Health Visitors from Ghizer and Gilgit, 16 in number, are participating in the programme. All training activities take place in the AKHS Field Modules in order to facilitate the application of the new skills in the daily work of the participants. The training programme started with two 3-day workshops in Karimabad and two workshops in Chatorkhand.

The workshops followed a learning-by-doing approach that included practical individual and group activities both in Health Centres and sessions with village women. The main learning points of the workshop were listening and questioning techniques, the participatory use of existing and new materials, and planning and evaluation of sessions. Communication materials such as story cards were developed during the workshop.

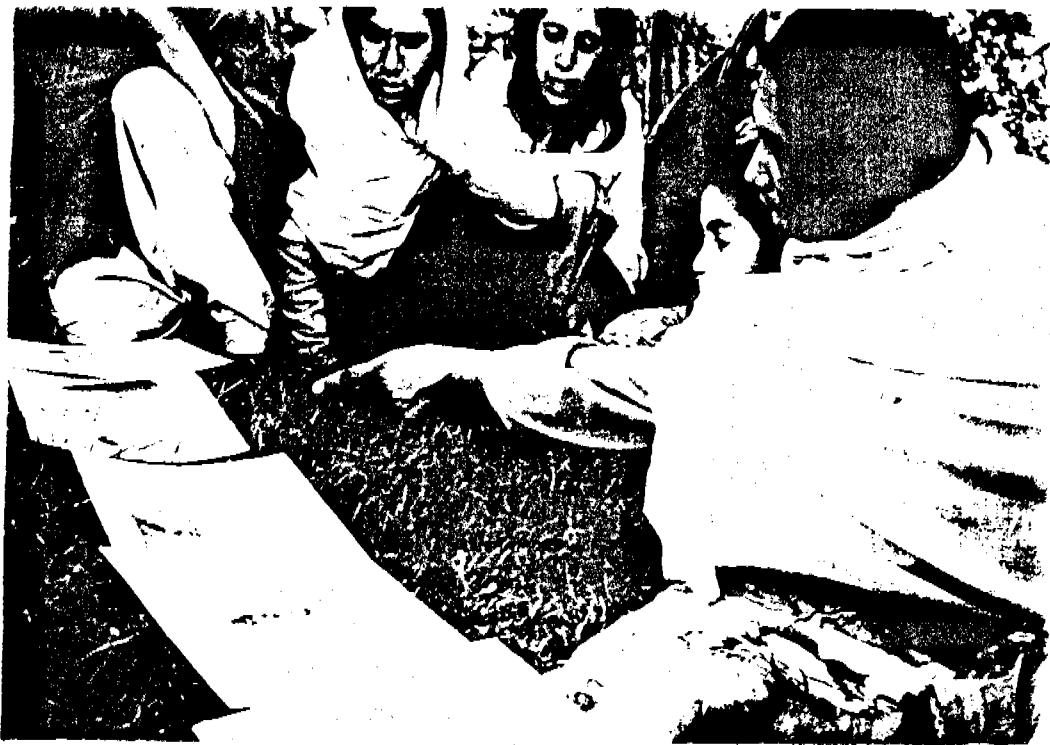


Figure 4: The LHVs practicing with the participatory method in a women group in Chatorkhand

In the period after the workshop the LHVs gave health education sessions using the techniques that they had learned. In June follow-up workshops of two days were organized in four Health Centres in Gupis, Chatorkhand, Karimabad and Gulmit. The LHVs discussed their experience with the participatory approach and with the story cards. After role plays and sessions with women in the villages the participants and facilitators gave feed-back on what to improve. The next workshop is planned for August, with a follow-up in September. A shorter workshop is contemplated for Women Social Organizers of AKRSP in Astore and Baltistan in the fourth quarter of the year.

ii) Hand washing study

One of the outcomes of the domestic observation studies in 1994 was that if villagers wash their hands they do this with ordinary water without using a cleaning agent like soap or ash. The study also identified two very positive local customs, one of offering water to guests for washing hands before the meal and another of thoroughly rubbing the hands while washing. Several documents on the subject confirm that rubbing is an important factor for the reduction of E-coli on hands. Based on these local customs a possible -and simple- health message was developed: 'Wash your hands well with plenty of water before eating'. To check the effectiveness of this message in terms of reduction of E-coli, a microbiological hand washing study was developed and carried out.

After procuring the necessary consumables, the microbiologists experimented with two possible methodologies which they had learned during the study visit to ICDDR in March. In the method selected, respondents are asked to rinse their hands in a container filled with Ringers solution and Tween 20. Subsequently this liquid is processed with the membrane filtration technique followed by incubation for 18 hours on agar.

The initial results of a first series of tests in Salmanabad and Oshikhandaas in June indicate that reduction of E-coli on hands after washing with water is lower than expected. In the second half of the year testing of hand washing will continue and besides washing with water this activity will look at the efficacy of using soap and possibly flour.

iii) Communication materials development

The graphic designer has continued to assist the development of communication materials with various team members. For example a simple technical guideline for the twin-pit compost latrine has been prepared. It consists of a series of step-by-step pictorial instructions which show villagers how to construct this latrine. Other new materials for health education and sanitation promotion have been developed, pre-tested and improved. New packages of 'folding cards' were prepared for Community Health Workers and Public Health Workers. These cards depict a problem story on the front and a positive story on the back, see Figure 5. Testing of the cards and the method is in progress.

As a result of the training given to LHVs in participatory health education, the Project started with assisting the preparation of materials for other projects of the AKHS. For example, for the rational use of drugs study a first set of story cards were developed and pre-tested. It is anticipated that this cooperation will expand and that the artist will progressively do more work for the AKHS Health Education Support Unit.

iv) Health Education Support Unit (HESU)

In April an LHV supervisor who was previously based in Chitral joined the AKHS Gilgit office to work on health education. She will be the lead person in the Health Education Support Unit, a new section that will assist field teams with training and development of communication materials for health education. The Project is providing assistance and training to her and other LHVs in order to develop a sustainable system for participatory health education.

تعلیم برائے صحت عامہ

ہاتھوں کی صفائی

ہوائے

کیونکہ ہمیں ہرگز نہ ہمارے ہاتھوں کو دھونا چاہیے



Figure 5: An example of a folding card with the problem story on the front and the positive story on the back

v) Knowledge Attitude and Practice survey (KAP)

In the second quarter of the year a start was made with a KAP-survey. This study will gather quantitative data about peoples behaviour, knowledge and ideas with regard to water and sanitation. The aim of the KAP-survey is to substantiate and verify findings of other smaller studies carried out over the past eighteen months, and to develop and test a baseline survey tool. The results will be used in the development of health education messages and other activities.

A KAP-questionnaire was completed in June after a lengthy process of developing, pre-testing and re-adjusting questions. Considering the work-load of the staff the sample size has been kept at 600 respondents living in 30 villages in Baltistan, Gilgit and Chitral. It is expected that by mid-July all data will have been collected. The Project has made efforts in developing a suitable computer programme that will facilitate the entering and analysis of the field data.



**WATER SANITATION HYGIENE & HEALTH STUDIES PROJECT
NORTHERN AREAS AND CHITRAL**

WITH COMPLIMENTS

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